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## ORIGINAL ARTICLES.

### SHAKESPEARE'S REFERENCES TO CONSUMPTION, CLIMATE, AND FRESH AIR.

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We have recently celebrated the Tercentenary Year of Shakespeare's death. On April 23, 1616, there died in Stratford-on-Avon the greatest of Englishmen, and one whose knowledge and insight into our frail humanity show that he possessed a master mind in medicine—as, indeed, he had in so many of the arts and sciences of life. We know that he was an actor and a playwright, and have not books been written to show that Shakespeare must have been a soldier,[1] a sailor, a lawyer,[2] an astronomer, a divine,[3] a printer,[4] a courtier, a sportsman, an angler,[5] and a gardener ?[6]

1 "Was Shakespeare ever a Soldier?" By W. J. Thomas, F.S.A., 1865.
2 "Shakespeare's Legal Acquirements considered in a Letter to J. P. Collier." By John, Lord Campbell, 1859. "Shakespeare a Lawyer." By W. L. Rushton, 1858.
3 Eaton's "Shakespeare and the Bible," 1858.
4 "Shakespeare and Typography; being an Attempt to show Shakespeare's Personal Connection with, and Technical Knowledge of, the Art of Printing." By William Blades, 1872.
5 "Was Shakespeare an Angler?" By H. N. Ellacombe, 1883.
6 "The Plant-Lore and Garden Craft of Shakespeare." By Rev. Henry N. Ellacombe, M.A., London, 2nd ed., 1884.

Before this Tercentenary recedes too far from our memory it might be interesting to set down a few references I have found in Shakespeare's works dealing with consumption, climate, and fresh air. It is curious that, although I could give quite a large number of quotations concerning syphilis, there are not half a dozen references to consumption in his plays. If Timon of Athens was referring to tuberculosis when he says, "Consumption catch thee" (iv. 3), he certainly suggests that the disease was looked on as contagious in the sixteenth century.

Falstaff may or may not be illustrating an analogy from phthisis and the general view that it was incurable when he says:

> I can get no remedy against this consumption of the purse; borrowing only lingers and lingers it out, but the disease is incurable.—*Henry IV.*, Part II., i. 2.

Beatrice, in a merry spirit, says she takes pity on her lover, as she had heard he was in a consumption:

> BEATRICE. I would not deny you; but, by this good day, I yield upon great persuasion; and partly to save your life, for I was told you were in a consumption. —*Much Ado About Nothing*, v. 4.

It should be noted that Beatrice indicates that, even in those days, consumption was curable.

Shakespeare shows an æsthetic appreciation of pure air:

> The climate's delicate; the air most sweet.—*The Winter's Tale*, iii. 1.
>
> The air breathes upon us here most sweetly.—*The Tempest*, ii. 1.

He well describes the air on cold nights—

> HAMLET. The air bites shrewdly; it is very cold.
> HORATIO. It is a nipping and an eager air.
> *Hamlet*, i. 4.

and appreciates the perfumed air of daybreak, for even the Ghost in "Hamlet" says:

> But, soft! methinks I scent the morning air.—*Hamlet*, i. 5.

He accepts the popular idea, still too common, that there is something particularly harmful in night air:

> PORTIA. Is Brutus sick? and is it physical
> To walk unbracèd, and suck up the humours
> Of the dank morning? What, is Brutus sick,
> And will he steal out of his wholesome bed
> To dare the vile contagion of the night,
> And tempt the rheumy and unpurgèd air
> To add unto his sickness?
> *Julius Cæsar*, ii. 1.

The good air of Scotland evidently appealed to him, for in "Macbeth" he exclaims:

This castle hath a pleasant seat; the air
Nimbly and sweetly recommends itself
Unto our senses. . . .
The heaven's breath
Smells wooingly here. . . .
The air is delicate.
*Macbeth*, i. 6.

But much more remarkable is his frequent commendation of fresh air for various conditions. Thus, for ordinary fainting, how slow is the willing but untrained public to act on the first principle so well expressed in the following lines:

Stand from him, give him air; he'll straight be well.—*Henry IV.*, Part II., iv. 4.

So play the foolish throngs with one that swoons;
Come all to help him, and so stop the air
By which he should revive.
*Measure for Measure*, ii. 4.

Free access of fresh air is advised for other conditions besides attacks of fainting. The line

The most wholesome physic of thy health-giving air.—*Love's Labour's Lost*, i. 1.

might serve as a motto for a sanatorium for tuberculosis, and the good influence of air on digestion is thus described:

The air is quick there, and it pierces and sharpens the stomach.—*Pericles*, iv. 1.

Even in more general affections, fresh air is one of Nature's best awakeners:

PEMBROKE. His highness yet doth speak, and holds belief
That, being brought into the open air,
It would allay the burning quality
Of that fell poison which assaileth him.
PRINCE HENRY. Let him be brought into the orchard here.
*King John*, v. 7.

I pray you give her air.
Gentlemen,
This queen will live: nature awakes; a warmth
Breathes out of her.
*Pericles*, iii. 2.

As opposed to a fresh-air régime, the drawbacks of a sedentary life, in which the vitiated air is the chief factor, are thus described:

Long sitting to determine poor men's causes
Hath made me full of sickness and diseases.
*Henry VI.*, Part II., iv. 7.

The atmosphere of crowded " At Homes " is little better now than in the days of Henry VIII.:

WOL. There's fresher air, my lord, in the next chamber.
KING. Lead in your ladies.
*Henry VIII.*, i. 4.

In spite of their easily aired clothing and their cult of baths, the great unwashed in Rome made it impossible then, as now, to ventilate a crowd. Menenius shouts to the Roman citizens:

> You are they
> That made the air unwholesome.
> *Coriolanus*, iv. 7.

In Timon's curse on Athens, after calling down plagues, fevers, sciatica, venereal diseases, itches, blains, and general leprosy, he exclaims:

> Breath infect breath,
> That their society, as their friendship, may
> Be merely poison!
> *Timon of Athens*, iv. 1.

The following line is taken, curiously enough, from "A Lover's Complaint":

> O, that sad breath his spongy lungs bestow'd!
> *A Lover's Complaint*, St. 47.

Now, there are few diseases that cause a characteristic fœtid breath, and I would suggest that Shakespeare attributed to the lungs the odour which in all probability arose from the gums. If the line were thus altered,

> O, that sad breath his spongy gums bestow'd,

it would serve as an excellent text for a paper on pyorrhœa! One of the risks of mouth-breathing was realized by Casca, when he said:

> I durst not laugh, for fear of opening my lips and receiving the bad air.—*Julius Cæsar*, i. 2.

and in connection with the mouth, it is most noteworthy that Coriolanus is made to send the following message to the citizens of Rome:

> Bid them wash their faces,
> And keep their teeth clean.
> *Coriolanus*, ii. 3.

Now, when we recollect that probably the first British monarch to see a tooth-brush was George III., and that the cult of this instrument of health is far from universal, it is little short of astonishing that Shakespeare should have preached this æsthetic hygiene three hundred years ago. Truly, he is one of our masters of medicine!

# THE TUBERCULOUS SOLDIER.

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WHATEVER may have been opinions prevailing at the beginning of the war as to the effects of campaigning on the tuberculous subject, it has now been driven home, very forcibly, that men suffering from pulmonary tuberculosis can be of little use in the army. The effects of continued active service, the strenuous life in the field, hardship, lack of food, want of sleep, prolonged and severe exertion, fear and mental strain, along with sanitary conditions, necessarily far from perfect, have been seen to play a most important part in breaking down resistance to, and restarting, tuberculous processes in those already predisposed to tuberculosis, recovering from this disease, or subjected to infection by tuberculous material. In this war the static conditions under which our armies have had to fight have to some extent counteracted the effects of the open-air life, of ample and suitable rations, and of other elements favourable to the maintenance of health. Dr. G. S. Banks, of Aberdeen, amongst those who take a view opposite to this, maintains that any risk that soldier patients "may run" is more than counterbalanced by the general influence for good which attends a life led in the open air. This conclusion, however, has not been borne out by facts.

Other writers have undoubtedly quoted isolated cases in which tuberculous soldiers have gone through hardships, without manifesting any untoward results *at the time*, but these writers have not been able to follow up their cases, and their conclusions can be of but limited value. Soldiers suffering from pulmonary tuberculosis have been proved to be of little use in the army; after a longer or shorter time they almost invariably break down, and soon pass beyond all hope of repair. This is well illustrated in an article by Dr. Thieme.[1] This observer was so convinced of the value of the open-air life of the soldier in its effects on tuberculosis, that he strongly encouraged the enlistment of ex-patients. He had under his care, from 1906 to 1915, 1,200 patients. "By means of the army authorities he was able to trace 1,117 of these ex-patients. It was found that 199 had died, 621 had been examined and

[1] Quoted in the *British Medical Journal*, June 10, 1915.

rejected for military service, 28 had been accepted and subsequently rejected for ill-health, 24 had been called up to the colours and not yet passed, 241 were either at the front or doing garrison duty." Sixty-four could not be traced. Of the 241 ex-patients who were either at the front or doing garrison duty, 187 had been in the first stage of the disease, 48 in the second, and 6 in the third. When they had been discharged from the sanatorium, 222 had been fit for work, 101 had been partly fit for work, and 7 had left the sanatorium before treatment had been completed. Such figures as these scarcely call for great enthusiasm as regards the rôle played by ex-sanatorium patients at the seat of war. It would have been more satisfactory from all points of view if Dr. Thieme had waited until the war was over, before he ventured to claim them as offering a striking proof of the success of sanatorium treatment.

### The Tuberculous Soldier in France.

In France the problem of the tuberculous soldier is already receiving attention, and the danger of sending tuberculous soldiers straight back to their homes is becoming more and more fully appreciated. The Tuberculosis Commission has been negotiating with the Red Cross Society with a view to utilizing part of their resources for the creation of military convalescent homes and preventoriums, and agricultural colonies where tuberculous military men may be kept as convalescents or eventually discharged as unfit after a period requisite to re-establish them and instruct them how to live. In spite of all this, the essence of the problem, in France as elsewhere, remains untouched, as it is obviously useless to instruct a man how to live when he has not the means of following the advice given, or of putting those precepts, however sound in principle, into practice.

The problem is not only how best to "cure" or arrest the disease of a great number of persons who have either contracted the disease while on active service, or have suffered an extension of pre-existing disease under the strain of military duties; it is a something far wider and much more difficult of solution. How to protect the community from a source of infection which has greatly increased as a result of war conditions is the problem—the fundamental principle upon which the treatment and prevention of the disease alone can be carried out.

The same subject has, however, in times of peace engaged the attention and taxed the energies of public authorities all over the country, and it has been recognized that the only way to combat the ravages of tuberculosis is to prevent the spread of infection from one individual to the other. It is true that in time past we have been accustomed to concentrate our attention too much on restoring, if but temporarily, the health of individuals, and have recommended cases in the second

and third stages of "consumption" for sanatorium treatment, often to the exclusion of earlier cases. We have filled our sanatoria with cases which could only benefit by such treatment for a short space of time, and which, returning too soon to their original surroundings, can only break down again and become sources of infection to other members of their families.

**The Care of Advanced Cases.**

The question of dealing with "advanced cases" of consumption is no longer a new one, and local authorities have been and are urged in no measured terms to provide accommodation for such cases; but the appeal falls on deaf ears, or at any rate on ears which are incapable of transmitting the message to the intelligence of the community. The type of accommodation that is offered to advanced cases of tuberculosis is unsuitable enough: either some beds at a Poor Law infirmary or a few beds in a ward of an isolation hospital—accommodation so obviously defective and insufficient for the needs of the civilian population that, when considered in connection with the discharged tuberculous soldier, is not only seen to be utterly inadequate, but unworthy of those discharged as no longer "fit" to serve in His Majesty's Army.

Are we justified in handing over our discharged consumptive soldiers to the Poor Law authorities, or in sending them for a few months to an infectious diseases hospital where they may be patched up, perhaps, and returned to their homes only to break down and succumb to the white scourge? Again, are we justified in offering to them domiciliary treatment by the Local Insurance Committee, and handing them over to the already overworked panel doctors, who, with the best intentions in the world, know how impossible it is to treat a case of advanced tuberculosis in a cottage? The position from a purely humanitarian point of view is not only inadequate, but altogether unsound, while the position from the public health point of view is certainly not a matter for congratulation.

The error of our system is gradually becoming apparent, and we are coming to realize that treatment at a sanatorium, for the working man at any rate, should only be recommended for those in the early stages of the disease, in what at one time was spoken of as the "incipient stage." These cases after a suitable period of treatment may be returned to their homes, to suitable or some more favourable employment, with every prospect of their becoming of real economic value. Indeed, sanatoria supported by public money should only be used for such cases, for it is only by adhering very rigidly to this rule that the full economic value of sanatorium treatment is to be secured.

To fill our institutions with cases to be patched up temporarily and

then discharged is to put these institutions to an utterly wrong and wasteful use, but under the present system of treatment of the tuberculous soldier this is exactly what we are doing. We appear to be afraid to tackle the question fully and firmly, and we seem to ignore the fact that the problem involves questions far more important than the individual treatment of the tuberculous patient.

Which of us is not familiar with the numerous schemes put forward for the treatment and care of the disabled soldier? But in not one of these schemes is the treatment of the tuberculous soldier brought in; indeed, it may be said to be rigidly and constantly excluded. The treatment of the soldier who is disabled through the loss of an eye or eyes, of limbs, or other similar injury, is a comparatively simple matter to deal with. It may be, perhaps, on account of the greater difficulty in dealing with the tuberculous soldier that the matter has not yet been taken firmly in hand, but has been allowed to drift, things going steadily from bad to worse.

As the war goes on, we have undoubtedly a larger and larger percentage of soldiers suffering from tuberculosis discharged from the army, although it is now accepted that the preliminary medical examination is far more stringent and searching than it was during the first rush to the colours. In spite of this, however, the physique of the conscript compares unfavourably with that of the voluntary recruit; and if experience counts for anything, we must anticipate a still greater percentage of tuberculous soldiers.

**Question of Organization and Administration.**

Some of those who have studied this question most carefully are firmly convinced that the provision made for the treatment and after-care of the soldier, devised and put into force by the War Office Authorities and the National Insurance Commissioners, will prove inadequate to cope with all that will be required of it, especially as, in delaying the treatment of the tuberculous soldier until he has been discharged from the army, there is involved the loss of the tremendous advantage of discipline. It appears to us that the after-care of the tuberculous soldier is an even more important question than it would be were steps taken to deal with the disease before the soldier leaves the army, and that it is essential that we should focus our attention on this after-care and study it in all its bearings, in order that not only a national but a rational scheme may be formulated. Isolated and local efforts can avail but little. It must, however, fall to the lot of some comparatively small body to crystallize the principles on which the after-care scheme can best be run; and an attempt has been made in Cambridgeshire, in the evolution of its after-care scheme, to insure that soldiers may share in the benefits, the provision of which has long

been recognized as necessary for tuberculous civilians. One of the great advantages of a scheme providing for both civilians and soldiers is that it is capable of unlimited expansion, and, with modifications, of being adopted throughout the country.

To allow our tuberculous soldiers to drift into infirmaries and workhouses would be a blunder and a crime; to allow them to die in their own homes would be more than uncharitable and ungrateful. Here is an opportunity, then, of encouraging these men, many of them at the outset of an entirely new life, to make a fresh start in their old homes, if suitable, or of placing them in new homes where conditions are at least not so far from the ideal as in many of those formerly occupied by them. They may be assisted without any taint of pauperism being allowed to appear, they may be controlled without being fettered, helped to become a source of happiness to themselves, but not isolated or shunned in the fear that they may become a source of infection to others.

**Preventing the Spread of Infection.**

Nevertheless, although in any after-care scheme the responsibility of doing the best for the individual rests upon those who frame it, the even more important task of preventing the spread of infection to others has to be kept in mind and acted upon. Under existing conditions, each soldier invalided from the army whilst suffering from pulmonary tuberculosis may become a source of infection to the civil population, often almost immediately, and still more frequently in the course of three or four months. Many of them cannot be persuaded to undergo sanatorium treatment at all; others, after a very short period of discipline and treatment, having been away from home so long, weakened and disheartened, weary to join their friends, cannot be persuaded to continue under treatment for more than a few weeks, and they insist on returning to their homes, there to drag out a miserable existence, to infect the members of their families, and eventually to succumb to disease and poverty.

It is essential that we should realize how great an opportunity there now is, and also how rapidly it will pass away; and that unless a very efficient and complete scheme of after-care is devised and carried into effect, and this at once, the war is going to leave us with a heavy legacy of tuberculous patients on our hands.

With a well-thought-out scheme at our disposal, the individual, whether soldier or civilian, will stand a much better chance of being returned to health and strength; but, perhaps equally important, he will be rendered inert as regards the dissemination of infection to others. Such a golden opportunity must not be allowed to pass, and it is well worth our while to put forth strenuous and united efforts to solve

some at least of the many problems involved in the treatment and after-care of the tuberculous soldier.

### A National System of After-Care.

The great and urgent need is for a rational and national system of "after-care." This has been recognized in the case of the civilian who returns from a sanatorium; there is an equally urgent need in the case of the discharged soldier.

It is obviously worse than useless to hand the soldier over to a lay committee, however anxious the members of that committee may be to do their part. The man's future life and conduct must be regulated from the medical point of view, though he must, of course, be provided with a satisfactory food allowance, whilst his home conditions should be made as favourable as possible. It is useless to allow a man to return to a two-roomed tenement, and tell him to "carry on" as he did at the sanatorium. He simply cannot do it. To apply the Cambridgeshire civilian scheme in the case of the discharged soldiers would be doomed to failure, on account of the more advanced stage of the disease in the soldier: no man is invalided from the army on account of tuberculosis who is not an open case. The Cambridgeshire scheme is only intended to include those cases suitable for sanatorium treatment and while the disease is in its infancy—*i.e.*, where no tubercle bacilli have been demonstrated in the sputum—and to keep a patient with arrested disease until he can become a self-supporting member of the community.

### A National Scheme.

With the discharged soldier, except in a small proportion of cases, a different plan must be followed. Such a plan must embrace the nation as a whole, as local endeavours are only mischievous and would be able to do nothing more than tinker with the problem. The question should be considered and decided under the following heads:

1. The treatment at a colony of the early cases, and their "after-care" followed up as in the Cambridgeshire scheme.

2. The treatment of the second stage cases at a sanatorium whence they should be transferred to a colony for further treatment as in Case 1, and their subsequent "after-care" taken in hand on land and in a settlement specially acquired for their reception, and on which their energies may be turned to remunerative account at some occupation—as nearly like their original work as possible.

3. The advanced cases should be kept under treatment at a central institution in the settlement, where they could be properly nursed, tended, and looked after, all danger of infection being eliminated. For

single men this would work admirably, but with married men with families some difficulties would no doubt be encountered at the outset.

**Suitable Training must be Provided.**

The report on the effort to be made to place soldiers on the land[1] should be followed as regards the after-care of soldiers discharged from the colony as early cases, as also with those discharged from the colony after undergoing their sanatorium treatment. They would then, eventually, be placed in houses on the settlement or estate where occupations would be found for them. Eventually they would form a nucleus around which to crystallize a tuberculous garden city.

A certain number of discharged soldiers would undoubtedly refuse treatment under this scheme, but from our experience we are convinced that, under proper medical supervision, discharged soldiers suffering from tuberculosis would gladly remove from unsuitable surroundings and migrate to the tuberculous garden city.

With the precautions which the health staff from the central building would be able to take in respect to the inmates of the cottages, the danger from the spread of infection would be reduced to a minimum; whilst, with suitable educational facilities that could be provided for the children in open-air schools in the village, the proper upbringing of the offspring would be assured.

The scheme would have to be financed by the State, but part of the outlay might be met by a certain fraction of the patient's pensions. This, together with the aid proffered by Friendly Societies, would put the married man into a fairly favourable position; whilst the money now expended upon the transient treatment of soldiers in sanatoria, usually followed by relapse at home, would be put to a sound use, and ultimately benefit the community by preventing the spread of infection.

Further, several counties are at the present time considering the desirability of segregating the advanced cases of tuberculosis; unless this is done humanely, more harm than good must result.

**Discharged Tuberculous Soldiers and Agricultural Work.**

The next step is to follow the instructions of the committee of recommendation *re* discharged soldiers and the land. There some assistance from the State must be forthcoming. Money granted by the State for the purpose would be well spent, for there has never been such a golden opportunity to insure the segregation of advanced cases of tuberculosis and put a stop to the spread of infection. The measure brought to a successful issue would afford one of the finest examples of preventive medicine ever inaugurated.

[1] See Departmental Committee on Land Settlement for Soldiers and Sailors.

It is objected that the married man could not be separated from his family. This objection is more imaginary than real, for if a man is assured that his wife and children will not suffer—indeed, will be well cared for—he will in many cases readily consent to live apart from them. In support of this, we would point out that it is a matter of common experience that in time the diseased member of the family becomes a burden almost too great to be borne. How often do we find, for example, that the wife begs for her husband to be taken away and treated, "if it is for his good." And it is indeed for his good that such a course should be pursued; and not only for his good, but for that of the rest of the family. There are, of course, cases in which separation is impossible; the man is unable to work, and the wife has to go out and earn her own living. In such cases it will usually be found to be a matter of little difficulty to move the whole family on to the estate, where the man, his wife and family, can be kept under medical supervision, where the risk of infection under the ideal hygienic surroundings obtained would be far less than in a stuffy house in a cramped street; and we should find that, given a certain amount of liberty, the new conditions would soon become acceptable to the family.

It is anticipated that the whole plan here so briefly outlined would gradually develop. The first phase, that of colony treatment, has passed the experimental stage, and is now an accomplished fact; but our after-care scheme is needed to make the whole comprehensive in extent and sound in principle. The money spent on sanatorium treatment will no longer be wasted on merely palliative and temporary measures, but will help towards the provision of a preliminary training which will fit the patient to conditions of life which now present the best possible chance of recovery to himself, and of the prevention of the spread of infection to others.

**Co-ordination Necessary.**

The various financial questions concerned—Health Insurance, Friendly Society payments, and State contributions—are matters for further consideration. But since the money now expended on the various heads is, obviously, not only running to waste, but as used is militating against the best interests of the community at large, it is surely extremely desirable to find a means of avoiding this waste, and of using any money available to the best and most lasting advantage.

There are at present too many central departments dealing with the problem of tuberculosis, and too many different local authorities whose divergencies are enhanced by the fact that they are supervised by different central departments. A unification of the central departments is greatly needed in order that there may be proper co-ordination of the efforts of the various local bodies, and an adequate active coherent policy adopted for dealing with this great problem.

# A CONTRIBUTION TO THE STUDY OF DELAYED OR "LATENT" TUBERCULOUS INFECTION.

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In the course of experiments made with the view of ascertaining the effect which the action of various agents had upon the virulence[1] of tuberculous products of human and bovine sources, one is sometimes able to observe evidence of a reduction in the pathogenic power of bacilli, and this reduction may be sufficient to render the cobaye capable of resisting bacillary invasion much in the same way as the meriones resists the action of bacilli of normal pathogenic power.[2]

The author has shown that for the purpose of estimating the effect which various agents have upon the virulence of a given strain of tubercle bacilli, the cobaye is eminently suitable, because this animal reacts readily and in a very uniform manner to tubercle bacilli obtainable from human, canine, bovine, equine, porcine and other mammalian tuberculous lesions, and in a certain proportion of cases can also be infected with avian tuberculous products.

Subcutaneous inoculation on the inner aspect of the hind leg at the level of the femoro-tibial articulation with a pure culture or matter containing an extremely small number of bacilli produces in the cobaye typical lesions, the extent and distribution of which are of great value in determining the number and virulence of the bacilli. Subcutaneous inoculations in other parts of the body, or intraperitoneal injections, yield much less comparable results. By using this method the author was able to observe that the virulence of bacilli obtained at different times from sources of a similar kind was capable of considerable variation.

Thus a certain strain of tubercle bacilli, obtained from a human lesion and exhibiting normal virulence so long as it was cultivated on blood serum at the optimum temperature, produced only slight and

[1] The word "virulence" is here used in its most general sense, including all that renders the organism capable of producing irritative and toxic lesions and of multiplying and spreading in its host.

[2] See Annual Report of the Medical Officer to the Local Government Board, 1908-09, pp. 344-9, with communication by S. Delépine, "On the Prevalence and Source of Tubercle Bacilli in Cow's Milk," in which there are references to previous papers published since 1893.

slow-spreading lesions after being kept absolutely dry in the dark for two months. After desiccation for a period of over four months, the same bacillus was incapable of producing any infective lesion. Other cultures were affected in the same way, but some were able to resist desiccation for longer periods. Pathological products such as tuberculous sputa, pus, milk are affected in a similar way by drying.

The action of radiant sunlight is so rapidly lethal that it is not easy to regulate the exposure so as to determine accurately the reduction in the virulence of the bacilli.

A reduction of virulence was also observed in the case of tuberculous milk kept at a low temperature (below 6° C.) in the dark for a considerable time. This milk, which had been collected with aseptic precautions and direct from a tuberculous udder in a sterilized vessel, contained a large number of virulent tubercle bacilli and a few other bacteria. When fresh it produced extensive uncomplicated tuberculosis in cobayes inoculated subcutaneously with it. The lesions were as usual extensive in all the lymphatic ganglia connected with the seat of inoculation three weeks after the inoculation. After this milk had been kept for 490 days,[1] as stated above, it was still capable of producing tuberculosis, but the mode of spread of the infection was abnormal. In the subcutaneous tissue and subjacent muscles in the neighbourhood of the seat of inoculation on the inner aspect of the leg, a large number of small isolated or confluent tubercles formed during the first month, and it was only towards the end of the first month that the inguinal glands began to enlarge. When the cobayes were killed, three months after inoculation, it was found that the tissues on the inner aspect of the thigh and the abdominal walls (including the peritoneum) in the corresponding inguinal region were the seat of a very large number of small fibro-caseous tubercles, almost confluent; the lymphatic glands behind the diaphragm were not more affected than is generally found to be the case three or four weeks after inoculation, but the liver, spleen, the lungs and most of the lymphatics in front of the diaphragm were the seat of extensive tuberculous lesions.

There appeared, therefore, to have been during the first month a tendency to a localization of the infective process, but afterwards the infective organisms which had been able to pass beyond the locality first affected must have regained their virulence and power to multiply, for the organs situated at a distance from the seat of inoculation showed lesions resembling closely those observed in the course of normal infection.

[1] The same milk was tested again after being kept four and a half years, when it was found that the bacilli were all dead, or at any rate incapable of producing tuberculosis. Cobayes inoculated with large quantities of this milk remained well for over one year after inoculation, and all their organs were found healthy *post-mortem*.

Similar effects were observed in the case of tuberculous cultures and tuberculous milk which had been heated for a definite length of time up to temperatures approaching lethal temperatures.

While conducting in 1899 a series of experiments on the sterilization of milk artificially infected with tubercle bacilli of human and of bovine origin, the writer observed that cobayes inoculated with milk which had been submitted to certain temperatures for a certain length of time remained apparently free from infection for several weeks, but that ultimately they became tuberculous. This delayed infection was observed when the milk had been heated to:

65° C. for 180 minutes (3 hours).
70° C. „ 45 „
74° C. „ 30 „
76° C. „ 10 „
85° C. „ 15 „ (In this case there was a delay of two months.)

Heating was conducted with very great care, as if the object had been to ascertain the coagulation temperature of a proteid. (This fact is of some importance in view of the statements which have been made as to the rapid lethal effect of a temperature of 85° C.) These experiments were repeated in 1911 with naturally infected milk obtained from the tuberculous udder of a cow. This milk was highly pathogenic when fresh, 0·2 gramme of it being capable of producing in 15 days a tuberculous ulcer at the seat of inoculation, well-marked tuberculosis of the popliteal, superficial, and deep inguinal, sublumbar and renal lymphatic ganglia corresponding to the leg inoculated, and distinct tuberculous lesions of the retrohepatic, bronchial, suprascapular ganglia, and of the spleen, liver, and lungs.

Some of that milk was divided into two parts, one of which was kept for control experiments and the other heated in a steam-jacketed copper pan, provided with a stirrer by means of which the milk was kept in constant motion, the temperature of the fluid was recorded by means of a well tested and controlled recording thermometer during the experiment. In the course of eight minutes the temperature rose from 58° C. to 78° C., and was for four minutes above 68° C. A sample of that milk was collected as soon as the temperature had reached 78° C. The same milk was heated for ten minutes more, the temperature rising gradually to 92° C. when a second sample was taken.

Three sets of cobayes were inoculated subcutaneously with the original milk and with the same milk after it had been heated to 78° C. and 92° C. respectively. The quantity of untreated milk inoculated was 1 c.c.; the quantity of treated milk was very much larger, the sediment of 40 c.c. obtained by centrifugalization being used. The animals inoculated with these samples were examined frequently during

life and the lesions recognizable by inspection and palpation noted. After the death of the animals they were dissected carefully and the various organs examined for tubercle bacilli, and it was found, *firstly*, that, during life, the cobayes which had been inoculated with milk which had not been heated had at the seat of inoculation a well-marked lesion beginning to ulcerate at the end of two weeks, and that the inguinal glands close to the seat of inoculation were distinctly enlarged and indurated. The cobayes which had been inoculated in the same way with heated milk showed, at the end of *ten weeks*, no ulceration, and no local lesion recognizable by palpation. *Secondly*, that the cobayes inoculated with untreated milk died within six weeks, and that at the time of their death they were affected not only with extensive tuberculous lesions at the seat of inoculation, and of the lymphatics connected with the local lesions, but also of most of the lymphatic glands of the body, in addition to which the spleen, liver, and lungs were extensively affected.

On the other hand the cobayes which had been inoculated with the heated milk were found, on being killed after eleven weeks, to be affected quite differently. In these, besides there being no local ulcer, there was either no visible local subcutaneous lesion, or only a very slight increase of fibrous tissue. There was also very slight enlargement of the popliteal and inguinal glands nearest the seat of inoculation, and only a few tubercle bacilli could be revealed in these. Other abdominal lymphatic ganglia, as well as the spleen, liver, and lungs, were the seat of extensive tuberculous lesions containing many tubercle bacilli.

Another group of experiments was conducted in which thin layers of milk were heated and evaporated at the same time. The temperature of the milk was raised from about 12° C. to 98° C. in less than three minutes, the material not being kept at the higher temperature for more than three seconds.

The results of inoculation were practically the same as in the previous experiments. A cobaye, killed five weeks after inoculation, *i.e.*, at a time when some indication of inguinal swelling had begun to be noticeable, was found to have very slightly enlarged popliteal inguinal and sublumbar lymphatic ganglia, tubercle bacilli being demonstrable in each. There was no sign of any lesion at the seat of inoculation. The lesions were similar to those observable from eight to ten days after inoculation with unheated milk.

The two last sets of experiments may be summed up as follows:

1. Cobayes inoculated with untreated tuberculous products rich in bacilli developed at the seat of inoculation extensive tuberculous lesions two weeks.

2. Cobayes of the same size and kept under identical conditions as the last, after being inoculated with a much greater quantity of

the same tuberculous products previously heated as stated above, developed very slight lesions at the seat of inoculation in the course of eleven weeks.

3. The viscera and the majority of the lymphatic ganglia of the cobayes inoculated with the untreated tuberculous products were the seat of extensive tuberculous lesions six weeks after inoculation.

4. In the cobayes inoculated with the heated tuberculous products, the viscera and lymphatic ganglia were in several cases affected nearly to the same extent as those of the cobayes inoculated with the untreated material, but this result was obtained after eleven weeks only.

5. From these results it would appear that most of the heated bacilli were at first barely capable of overcoming the resistance offered to them by the phagocytes in the region first infected, but that some bacilli had escaped and had been carried away probably by some of the migratory cells. These bacilli had been able to multiply and to regain their pathogenic power.

6. The facts observed seem also to indicate that the recuperation of this pathogenic power became more marked as the distance from the seat of inoculation increased, for, while the local lesions remained insignificant, those of distant organs were practically as extensive as those found in the animals inoculated with untreated milk.

7. The relation between the extent of the tuberculous lesions and the distance from the seat of inoculation indicates that the bacilli which had successfully overcome the various obstacles offered to their progress had gradually become not only more numerous but also more virulent. This suggests strongly a process of *reinforcement of virulence by relays*, similar to that observed in the production of a "Virus fixe" by passage through a series of animals according to Pasteur's method.

In the experiments referred to in this paper, the period of latency did not exceed three or four weeks, but it was sufficiently long to reveal an aspect of infection processes which must be of great importance, more especially in relation to latent infections.

The fact that tubercle bacilli were still living and capable of a modified pathogenic action after being kept for nearly 500 days in a natural tuberculous product (milk), supports the view that under certain circumstances tubercle bacilli are still infective after remaining dormant for a considerable period of time.

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# THE VALUE OF ARNETH'S LEUCOCYTE COUNT IN PULMONARY TUBERCULOSIS.

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Any method the use of which improves our power of diagnosis in pulmonary tuberculosis and at the same time enhances the value of prognosis in this affection deserves careful attention, being of great importance not only to the individual affected therewith, but also to the public health of the community. One such method is supplied by a careful study of the behaviour of certain leucocytes present in the blood as revealed by the examination of appropriately stained blood-films.

Of the various types of leucocyte found by this method of examination to exist in normal blood, the polymorphonuclear neutrophilous leucocyte is the one most abundantly present, constituting about 65 to 75 per cent. of the total number of leucocytes, whilst a still larger proportion is often found in the inflammatory leucocytoses. It is also the most actively phagocytic of the leucocytes, as was demonstrated by Metchnikoff, by whom it was termed "microphage," and considered to be the producer of the ferment-like body "microcytase," by the action of which digestion of the phagocytosed bacteria is brought about.

The most striking microscopic characteristic of this variety of leucocyte is provided by the nucleus, which is always single, but from the amount and variety of segmentation present may present the appearance of multiple nuclei; hence the designation "polymorphonuclear," or, as it is commonly abbreviated, "polynuclear" or "polymorph," given to this leucocyte. These nuclear segments may number from one to five or more, and present a great variety of shape.

**Arneth's Classification.**

In 1904 Arneth showed that the number of nuclear segmentations in the leucocytes of normal blood are present in very constant proportions, and this fact constituted the basis of his method of classification and enumeration. He grouped the polymorphs into five classes: Class I., with unipartite or undivided nucleus; Class II., with bipartite nucleus, consisting of two segmentations; Class III., with tripartite nucleus, consisting of three segmentations; Class IV., with quadripartite nucleus, consisting of four segmentations; and Class V., with multipartite nucleus, consisting of five or more segmentations. Great elaboration resulted from a further subclassification according to whether the nuclear segments were round, oval, or looped, and according to the varying proportions of each of these shapes present. As a routine procedure this elaborate subdivision would appear to be unnecessarily complex, especially as no definition of what precisely constituted these various figures was given, a sufficiently accurate and comprehensive neutrophile blood-picture being obtained by the use of the above-mentioned five classes. In normal conditions this neutrophile blood-picture is remarkably constant, showing very little variation from the numbers given by Arneth (Table I.).

TABLE I.—SHOWING THE PERCENTAGE OF NEUTROPHILE LEUCOCYTES ARRANGED ACCORDING TO THE NUMBER OF NUCLEAR SEGMENTS IN NORMAL BLOOD.

| | Class I. | Class II. | Class III. | Class IV. | Class V. |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Normal .. .. .. | 5 | 35 | 41 | 17 | 2 |

As the nuclear segments are separated from each other by divisions of varying distinctness, it is sometimes difficult to say exactly what the precise number of segments present in any particular leucocyte is; hence different observers might readily obtain quite different proportions of these classes in enumerating one and the same slide. In order to obtain a more accurate standard in this matter, we consider that anyone undertaking the enumeration of the leucocytes by this method should undertake preliminary practice with known normal bloods until he can consistently obtain Arneth's figures given above. Otherwise no reliance can be placed on the figures obtained.

The method employed is as follows: After cleansing the skin of the finger with ether, the specimen of blood is obtained by sharply pricking the finger with a Hagedorn needle sterilized by passing through the flame. The drop of blood so obtained is placed on a clean slide, and a uniform film obtained by spreading it with another slide pushed along

it at an angle of 45 degrees. The film thus obtained is allowed to dry in the air and stained by any appropriate stain, such as Giemsa, Leishman, Jenner, or Ehrlich's triacid stain.

In the series here recorded Leishman's stain was employed throughout. The air-dried film was flooded with stain, and after two minutes double the amount of distilled water was added, the two thoroughly mixed together and allowed to stand for a further period of eight minutes. Care should be taken that the slide is not allowed to dry. The film was then thoroughly washed in distilled water and allowed to dry in the air. Microscopic examination was carried out, using a $\frac{1}{12}$-inch oil immersion lens. To facilitate counting and to avoid counting the same field twice over, a movable stage should be used. One hundred neutrophilic leucocytes were counted in each case, the classification according to the number of nuclear segments being made.

In order to rule out any preconceived idea, the samples in our series were taken by one of us (H. W.) who was acquainted with the condition of the patient, and the staining and enumeration was undertaken by the other (F. E. T.), to whom the numbered slides only were handed over.

The analysis of cases investigated by the above method brings out some very striking results, and invests Arneth's leucocyte count with a usefulness in prognosis and diagnosis hitherto insufficiently recognized.

As regards its value in diagnosis, in the following series of cases there was considerable doubt as to a tubercular lesion, and the leucocyte count in each case gave a proportion of nuclear division which was practically normal (Table II.).

These cases are all still under observation, and remain perfectly well.

TABLE II.—SUSPECTED TUBERCULOSIS, GIVING NORMAL ARNETH'S COUNTS. NO TUBERCULOSIS DEVELOPED.

| *Case No.* | *Normal=* | **5** | **35** | **41** | **17** | **2** |
|---|---|---|---|---|---|---|
| 1. McG. | M. | 3 | 19 | 34 | 31 | 13 |
| 9. M. L. | F. | 8 | 37 | 40 | 13 | 2 |
| 19. W. B. | M. | 7 | 45 | 21 | 15 | 4 |
| 21. D. B. | F. | 1 | 35 | 48 | 15 | 1 |
| 24. M. H. | F. | 8 | 41 | 38 | 11 | 2 |
| 40. M. Y. | F. | 3 | 36 | 46 | 12 | 3 |
| 44. A. C. | F. | 6 | 30 | 44 | 15 | 4 |
| 77. W. G. | M. | 4 | 38 | 38 | 10 | 4 |
| 5. W. R. | M. | 1 | 29 | 44 | 21 | 5 |
| 37. E. C. | F. | 4 | 25 | 49 | 20 | 1 |

As opposed to Table II., but also showing considerable value in diagnosis and prognosis, is the following table (Table III.), in which

cases there was a pronounced deviation to the left; that is to say, a large relative increase in the number of corpuscles with few divisions of the nuclei.

These cases, seventeen in number, have all died since, the case with the strongest deviation dying within a week of the count being taken (No. 75, A. S.).

TABLE III.—LÆVODEVIATION—DEAD.

| *Case No.* | *Normal=* | 5 | 35 | 41 | 17 | 2 |
|---|---|---|---|---|---|---|
| | ♂ | | | | | ♀ |
| 4. G. C. | M. | 10 | 54 | 29 | 6 | 1 |
| 16. G. L. | M. | 10 | 53 | 25 | 12 | 0 |
| 26. G. F. | M. | 10 | 56 | 28 | 6 | 0 |
| 31. G. C. | M. | 18 | 48 | 28 | 6 | 0 |
| 33. N. C. | F. | 17 | 51 | 29 | 3 | 0 |
| 36. C. S. | M. | 14 | 66 | 15 | 4 | 1 |
| 38. G. T. | M. | 7 | 59 | 28 | 6 | 0 |
| 28. T. T. | M. | 28 | 43 | 23 | 5 | 1 |
| 43. W. M. | M. | 9 | 44 | 37 | 8 | 2 |
| 45. W. C. | M. | 12 | 47 | 29 | 10 | 2 |
| 50. W. T. | M. | 12 | 48 | 32 | 7 | 1 |
| 51. W. A. | M. | 7 | 47 | 35 | 10 | 1 |
| 55. W. A. | M. | 12 | 41 | 38 | 7 | 2 |
| 56. C. S. | F. | 13 | 52 | 29 | 6 | 0 |
| 61. M. B. | F. | 20 | 26 | 24 | 10 | 0 |
| 75. A. S. | M. | 20 | 59 | 30 | 4 | 2 |
| 65. L. S. | F. | 20 | 48 | 25 | 5 | 2 |
| 59. J. N. | M. | 17 | 50 | 28 | 5 | 0 |

A number of cases with definite lævodeviation are still under observation, and the present condition of each is given in the following table, from which it will be seen that the greater number of cases are steadily deteriorating:

TABLE IV.—LÆVODEVIATION—STILL LIVING.

| *Case No.* | *Normal=* | 5 | 35 | 41 | 17 | 2 | *Remarks.* |
|---|---|---|---|---|---|---|---|
| 6. R. P. | M. | 10 | 47 | 32 | 10 | 1 | Chronic fibrosis, doing badly. |
| 14. E. W. | F. | 18 | 64 | 17 | 1 | 0 | Chronic fibrosis, stationary. |
| 18. R. Q. | M. | 18 | 46 | 22 | 10 | 4 | Surgical, genito-urinary, early lung. |
| 20. A. C. | M. | 31 | 57 | 10 | 2 | 0 | Fibrosis, improving. |
| 42. R. W. | M. | 16 | 45 | 32 | 4 | 3 | Chronic, doing badly. |
| 52. E. D. | M. | 11 | 43 | 48 | 6 | 2 | Chronic, frequent hæmoptysis. |
| 60. E. H. | F. | 10 | 39 | 39 | 11 | 1 | Doing badly. |
| 66. I. O. | M. | 21 | 47 | 29 | 2 | 1 | Chronic, doing badly. |
| 67. E. G. | F. | 17 | 46 | 34 | 2 | 1 | Doing badly. |
| 72. H. S. | M. | 14 | 28 | 34 | 18 | 6 | Improving under tuberculin. |
| 76. G. G. | M. | 14 | 48 | 30 | 8 | 0 | Slowly deteriorating. |
| 73. E. B. | F. | 14 | 50 | 30 | 4 | 2 | Chronic, old cavity, doing badly. |

Intermediate between the above classes there lies a large number of cases in which the diagnosis was definite, but there was no marked

deviation. These cases as a whole were cases with limited lesions, and with few exceptions ran a favourable course; in fact, most ended in "arrest." Three, however, died (Nos. 58, 10, 23)—one who had basal pleurisy and the other two old cavities.

Therefore, taking Tables II. and IV. together, one may assume that if the count is approximately normal the case is either non-tubercular or, if definitely tubercular, the prognosis as to the possibility of arrest is good; whereas the opposite condition prevails where there is considerable lævodeviation.

The following table (V.) includes the intermediate class mentioned above:

TABLE V.—DEFINITE DIAGNOSIS, NO MARKED DEVIATION.

| *Case No.* | *Normal=* | **5** | **35** | **41** | **17** | **2** | *Remarks.* |
|---|---|---|---|---|---|---|---|
| 7. M. G. | F. | 3 | 18 | 36 | 29 | 14 | |
| 10. G. C. | M. | 8 | 27 | 32 | 18 | 15 | Died. |
| 12. E. I. | F. | 8 | 42 | 40 | 9 | 1 | |
| 15. B. T. | F. | 3 | 19 | 33 | 32 | 13 | |
| 17. E. G. | F. | 3 | 47 | 38 | 10 | 2 | |
| 23. E. N. | M. | 6 | 44 | 43 | 6 | 1 | Died. |
| 24. E. H. | F. | 8 | 41 | 38 | 11 | 2 | |
| 29. M. R. | F. | 3 | 37 | 21 | 21 | 2 | |
| 30. I. C. | M. | 8 | 36 | 39 | 4 | 3 | |
| 34. M. H. | F. | 2 | 37 | 48 | 10 | 3 | |
| 35. T. D. | M. | 5 | 40 | 38 | 15 | 2 | |
| 48. E. B. | M. | 5 | 39 | 34 | 17 | 4 | |
| 41. M. S. | F. | 8 | 41 | 41 | 7 | 3 | |
| 44. A. C. | F. | 6 | 30 | 44 | 15 | 4 | |
| 47. M. S. | F. | 8 | 41 | 31 | 15 | 4 | |
| 49. I. S. | M. | 7 | 43 | 34 | 11 | 1 | |
| 57. I. G. | F. | 7 | 44 | 37 | 9 | 3 | |
| 58. G. I. | M. | 8 | 36 | 46 | 6 | 4 | Died. |
| 61. G. B. | M. | 6 | 33 | 45 | 11 | 5 | |
| 62. F. G. | F. | 7 | 33 | 51 | 7 | 2 | |
| 64. A. W. | F. | 4 | 32 | 40 | 20 | 4 | |
| 69. G. W. | M. | 8 | 48 | 28 | 1 | 0 | |
| 70. G. C. | M. | 6 | 32 | 44 | 16 | 2 | |
| 74. C. B. | M. | 8 | 30 | 42 | 14 | 6 | |
| 79. F. H. | F. | 5 | 43 | 36 | 14 | 2 | |
| 73. E. B. | F. | 4 | 36 | 48 | 10 | 1 | |
| 25. W. T. | M. | 8 | 33 | 39 | 17 | 3 | |

An exception to these rules is observed where the larynx is involved, as in several cases the patients have had a fair nuclear count, but have retrogressed owing to difficulty in taking sufficient nourishment. These cases die more from starvation and the depression induced by their unfortunate condition than from toxæmia, and in these cases where the larynx improves the general condition and leucocyte count improve also.

Three such cases are included in this series; one died under the above conditions, the second is rapidly declining, the third is now im-

proving, as the laryngeal condition has become less acute and the leucocyte count has equally improved. The two counts are given in Table VIII.

TABLE VI.—LARYNGEAL COMPLICATING PULMONARY TUBERCULOSIS: NO MARKED DEVIATION.

| *Case No.* | *Normal=* | **5** | **35** | **41** | **17** | **2** | *Remarks.* |
|---|---|---|---|---|---|---|---|
| 43. W. M. | M. | 9 | 44 | 37 | 8 | 2 | Dead. |
| 53. G. T. | M. | 4 | 48 | 37 | 10 | 1 | Retrogressing. |
| 76. G. G. | M. | 14 | 48 | 30 | 8 | 0 | Improved. |

In cases where tuberculin has been administered it is observed that those with lævodeviation have lived longer than those to whom it has not been given, in spite of their blood condition—a fact which suggests that the toxæmia is to some extent antagonized by the effect of the tuberculin.

The following three cases with advanced tuberculosis in both lungs who had full courses of tuberculin exemplify this rule:

TABLE VII.—EFFECTS OF TUBERCULIN.

| *Case No.* | *Normal=* | **5** | **35** | **41** | **17** | **2** | *Remarks.* |
|---|---|---|---|---|---|---|---|
| 38. G. I. | .. | 7 | 59 | 28 | 6 | 0 | Lived fourteen months. |
| 4. G. C. | .. | 10 | 54 | 29 | 6 | 1 | Lived two years. |
| 59. W. N. | .. | 17 | 50 | 28 | 5 | 0 | Lived six months; died of surgical complications. |

In reference to tuberculin one case is particularly instructive, three counts having been made at long intervals. After a course of B.E. the nuclear count improved and the disease was temporarily arrested. In a few months recrudescence occurred, the count again showing deviation to the left, and clinical signs of activity reappeared in the lung (see Case No. 2, Table VIII.). The count has been found in many cases to vary *pari passu* with the symptoms, and in the following table is given the results of two or more counts at intervals in the same patients, with the condition at each count, thus marking the progress of the case:

The table on p. 118 also shows the advantage of multiple counts, and suggests that one count only has not the same prognostic value as a series of investigations made at intervals. So consistent are the results obtained in the above investigation that it is possible to prognose the case in many instances even without having examined the patient, particularly if a series of counts are made.

TABLE VIII.—REPEATED COUNTS.

| *Case No.* | *Normal=* | **5** | **35** | **41** | **17** | **2** | *Date.* | *Remarks.* |
|---|---|---|---|---|---|---|---|---|
| 73. E. B. | F. | 4 | 36 | 48 | 10 | 1 | March, 1916 | Old cavity; gradual decline. |
| | | 14 | 50 | 30 | 4 | 2 | March, 1917 | |
| 34. M. H. | F. | 2 | 37 | 48 | 10 | 3 | Sept., 1915 | Keeping well, but losing energy. |
| | | 8 | 44 | 32 | 12 | 4 | March, 1917 | |
| 25. W. T. | M. | 8 | 33 | 39 | 17 | 3 | August, 1915 | Died December, 1916. Tuberculin in early stages prolonged life. |
| | | 12 | 47 | 29 | 10 | 2 | Feb., 1916 | |
| 59. N. | M. | 17 | 48 | 28 | 5 | 2 | Feb., 1916 | Lungs improved. Developed surgical complications, and died December, 1916. |
| | | 13 | 48 | 35 | 3 | 1 | Sept., 1916 | |
| 2. F. H. | F. | 14 | 44 | 26 | 12 | 4 | Dec., 1914 | Count at first consultation; disease active. |
| | | 5 | 43 | 36 | 14 | 2 | Feb., 1915 | Apparent arrest of lung symptoms. |
| | | 9 | 44 | 40 | 7 | 0 | March, 1917 | Return of local signs and symptoms. |
| 17. N. G. | F. | 3 | 47 | 38 | 10 | 2 | March, 1915 | Early definite case. |
| | | 6 | 46 | 41 | 6 | 1 | March, 1917 | No great change; signs of arrested lesion. |
| 53. G. T. | M. | 4 | 48 | 37 | 10 | 1 | March, 1916 | Extensive disease not very active. |
| | | 7 | 39 | 38 | 13 | 3 | March, 1917 | Lungs I.S.Q. Larynx serious. |
| 81. M. S. | F. | 7 | 43 | 34 | 11 | 1 | Feb., 1916 | Early case, well marked. |
| | | 8 | 42 | 39 | 9 | 2 | March, 1917 | Arrested, working, but general condition bad. |
| 82. M. F. | F. | 7 | 33 | 51 | 7 | 2 | Oct., 1916 | Early case, definite. |
| | | 6 | 41 | 34 | 16 | 3 | March, 1917 | Arrested, working; fairly well. |
| 87. G. G. | M. | 14 | 48 | 30 | 8 | 0 | Dec., 1916 | Acute febrile attack. Larynx involved. |
| | | 6 | 30 | 39 | 22 | 3 | March, 1917 | Much improved, working; larynx improved. |
| 85. A. C. | M. | 31 | 57 | 10 | 2 | 0 | July, 1915 | Disease very active and widespread. |
| | | 4 | 27 | 38 | 27 | 4 | March, 1917 | Much fibrosis, becoming chronic. |

**General Conclusions.**

The practical conclusions drawn from the above series of observations may be summarized as follows:

Where there is much lævodeviation no great permanent benefit may be anticipated from treatment beyond a prolongation of life. Should lævodeviation be absent, even with an extensive lesion, the probability is that the disease will progress to chronicity. There are cases where an active process with lævodeviation may develop into a smouldering fibrosis (Cases 85 to 87, Table VIII.) with improvement in the leucocyte count, and this process seems to be favoured by the administration of tuberculin.

Prognosis is a point on which the clinician is frequently consulted, and it is then that an investigation of the nuclear condition of the leucocytes by Arneth's method can render valuable aid.

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# A SANATORIUM MARKET GARDEN COLONY.

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In the symposiums of opinions as to the future of the Anti-Tuberculosis Movement published in this journal in January, 1916 and 1917, more than one writer touched upon the relative inefficiency of sanatoria as a means of curing the consumptive among the working classes. Experience has shown that three months' treatment in a sanatorium is not sufficient in most cases permanently to arrest pulmonary tuberculosis, and that too often the consumptive worker is for a time greatly benefited, only to relapse upon his return to his ordinary conditions of life. Something further is needed to supplement the work of the sanatorium. Present opinion appears to favour the establishment of country colonies to which patients, on discharge from a sanatorium, could be drafted, there to continue their treatment for some months longer, and at the same time learn an occupation suitable for their condition. Another suggestion which offers great possibilities is contained in a recommendation of the committee appointed to investigate the incidence of pulmonary tuberculosis among operatives in the boot and shoe trade.[1] This committee advises the erection of specially constructed sanatorium factories in which consumptive workers could

[1] See National Health Insurance, Medical Research Committee, 1915.

follow their usual trade under favourable conditions. As yet, however, attention has been directed chiefly to the idea of giving the convalescent consumptive an agricultural training with a view to settling him on the land. Without some training, agriculture and allied callings offer scant hope of a livelihood. It seems certain that country colonies will be a feature of the Anti-Tuberculosis Campaign in the near future. Such a colony, a pioneer, the experience of which will be invaluable, is actually in being—The Hairmyres Colony, Lanarkshire, instituted in 1915 by the District Committee of the Middle Ward of the County of Lanark.

In view of the existing interest in the subject, the following account of an earlier experimental colony may be acceptable. Known as Coppins Green Market Garden Colony, it was opened in February, 1907, by my former colleague, Dr. J. E. Chapman, now on the staff of the Local Government Board of England, and run by him until December, 1908. In 1913 Dr. Chapman kindly placed the records of his experience at my disposal for the benefit of my colleagues on the Departmental Committee for Tuberculosis at that time sitting; with his consent I now give the work a wider publicity.

A chance meeting of the writer with a gentleman interested in social welfare determined the site of the colony. It resulted in the offer, at a moderate rental, of some buildings and land close to Clacton-on-Sea. For the treatment of consumption, the site was admirable. The buildings, too, which had been designed as a holiday home for poor boys, were well adapted for conversion into a sanatorium. They consisted of a two-storied brick building containing three airy dormitories, a dining-room, and accommodation for a small staff, and a detached five-roomed cottage. The dormitories furnished most satisfactory quarters for twenty convalescent patients, the cottage providing accommodation for the staff. The land, unfortunately, was not suitable. It consisted of 9 acres of grassland which had been out of cultivation for some years. The condition of the land proved a great initial handicap in the development of the market garden. The premises and land were leased for £34 per annum. As intended by Dr. Chapman, and as finally constituted, the colony was a combination of a sanatorium and a market garden. The patients, at first limited to fifteen, paid 25 shillings a week, but for all work performed by them they were paid wages at the market rates per hour prevailing in the neighbourhood. It was hoped that by this means patients would be enabled, in a varying degree, to earn the cost of their maintenance, thus allowing them to remain at the colony for an extended period; and that the sale of the garden produce would cover the wages bill. Further, it was hoped that some of the patients would take up gardening permanently as an occupation. The payment for patients' labour at the market rate was

an admirable feature of the administration, being a source of much encouragement. I note that at the Lord Roberts Memorial Workshops for the re-education of disabled soldiers, the same principle is adopted. As the colony developed, an additional seven beds were opened, for which a weekly fee of 13s. 4d. was charged. These beds were reserved for able-bodied patients who were anxious to make a long stay. The market garden was run on business lines. The produce grown was chiefly potatoes, cabbages, peas, beans, carrots, turnips, etc. Such of it as was consumed on the colony was paid for by the management at market prices: The rest was sold locally, there being always a good market in Clacton. It is worth recording that no prejudice was exhibited against the produce by reason of its place of origin. A small trade was also done in the cultivation of herbaceous plants. As to the capacity of the patients for work: I have heard doubts expressed as to the feasibility of running a farm colony with consumptive labour. Dr. Chapman had to rely upon the customary medical certificates when selecting his patients. His experience, familiar to all superintendents of sanatoriums, was that many patients sent as cases of early disease proved to be suffering from advanced lesions, rendering them quite unsuitable. Despite this handicap, it was found that, with the exception of the ploughing, all the work of the market garden could be carried out satisfactorily by the patients. In the course of eighteen months, the colonists cleaned and brought into good cultivation 6 acres of derelict land. This was accomplished by an average of nineteen patients, working on an average twenty-three hours a week. The patients were drawn almost entirely from urban centres and from indoor occupations. This reclamation of land constituted no small part of the productive work of the patients, the benefit of which, owing to its short tenancy, the colony reaped to a limited extent only. In the case of a colony under a public authority, a similar improvement of land could justly be estimated and credited to the management.

The staff of the colony consisted of Dr. Chapman, a nurse-matron, a cook, two maids, a boy, a convalescent patient who acted as nurse-orderly, and an ex-patient, a gardener by profession, who assisted in the direction of the garden, and was paid at the rate of 4½d. per hour. The patients made their own beds, but the housework generally was done by some of the patients, who were paid for these services. In all, of a sum of £212 paid by the management for domestic work on the colony, £73 was earned by them.

The routine at the colony was modelled upon that of a sanatorium. All the essentials of the sanatorium were secured—namely, abundance of fresh air, a generous diet, regulated rest and exercise, regular hours, and medical supervision. The diet deserves mention as an example of

a cheap and efficient dietary for the working-class consumptive. Its cost per head for patients and staff worked out at 8s. 1½d. per week.

BREAKFAST.

| | |
|---|---|
| Porridge, ½ pint, containing 2 oz. oatmeal. | Sugar, 2½ oz. |
| Bacon, 1½ oz. (2⅓ oz. uncooked). | Bread, 2 oz. |
| Milk, a cupful (5½ oz.). | Butter, ¼ oz. |

DINNER.

| | |
|---|---|
| Joint, 4⅓ oz. (8¾ oz. as purchased). | Suet pudding, 5½ oz. |
| Potatoes, 6 oz. (8 oz. as purchased). | Bread, a small slice. |
| Green vegetables. | Milk, ½ pint. |

TEA.

| | |
|---|---|
| Bread, 5 oz. | Tea. |
| Butter, ½ oz. | Sugar, 1 oz. |

SUPPER.

| | |
|---|---|
| Liver, fish, sausage, cold ham, or pulse soup, containing 3 oz. of pulse per head. | Cheese, ½ oz. |
| | Cocoa in winter, or milk in summer, 1 pint. |
| Bread, 1½ oz. | Sugar, 1 oz. |
| Butter, ¼ oz. | |

A small allowance of coffee, bread, and cheese, was given to the workers in the garden in the middle of the morning.

*The Results of the Experiment.*—Dr. Chapman was fully satisfied with the clinical results obtained. That this would be the case was never doubted, however. It is of more importance to consider how far the more special aims of the colony were realized, and what inferences may be drawn as to the economic soundness of similar undertakings. To deal first with the financial showing of the colony: This is best indicated by a statement of accounts during the period of twelve months when the work was fully organized. It should be stated that the capital outlay amounted to £510. Of this sum, £450 was expended upon structural alterations, reorganization of the drainage, and the laying on of a water-supply from the Clacton mains. The remaining £60 represents the cost of the garden equipment: tools, fencing, outhouses, etc.

The following statement shows the actual cost of maintaining an average of twenty patients during the twelve months August 1, 1907, to July 31, 1908:

| | £ | s. | d. |
|---|---|---|---|
| Provisions .. .. .. .. | 555 | 7 | 10 |
| Cleaning, heating, lighting, laundry .. .. | 98 | 7 | 7 |
| Dispensary .. .. .. .. | 14 | 7 | 0 |
| Office, stationery, cartage, etc. .. .. | 32 | 1 | 2 |
| Medical Superintendent's salary .. .. | 150 | 0 | 0 |
| Wages of domestic staff .. .. .. | 73 | 12 | 8 |
| Rent, taxes, insurance, repairs .. .. | 96 | 2 | 1 |
| Outside labour hired .. .. .. | 14 | 0 | 0 |
| Seeds, manure, plants, etc. .. .. .. | 48 | 10 | 0 |
| | 1,082 | 8 | 4 |
| Deduct income from sale of produce .. | 40 | 0 | 0 |
| Net cost .. .. .. .. | £1,042 | 8 | 4 |

The cost of treating an average of twenty patients for the twelve months thus worked out at almost exactly 20 shillings a week per patient. This shows how economically efficient treatment can be given to the consumptive. To bring out this point, I have not taken into account the sum paid to the patients as wages, since, if similar colonies are established, it is probable that the profit arising from the work of the patients will be devoted entirely to reducing working expenses. Actually, during the twelve months under review, £125 was paid to the patients. As was anticipated, the more convalescent were able to earn a sum not far short of the fee charged for their maintenance. In the above financial statement, also, no credit has been allowed on account of improvement of the land. Financially, then, the results were distinctly encouraging. Had the colony existed for some years, with the increasing return from the gardens, the financial position would have become progressively stronger.

With regard to what one may term the re-education of the consumptive, the Clacton work gave no certain indication. Few of the patients remained long enough thoroughly to learn market gardening as a means of livelihood. Though some took to the land, for the most part in the colonies the majority returned to their usual occupations. Without something in the nature of co-operative small holdings, State-aided settlements on a large scale, or special labour bureaus, it would seem that country colonies would serve more as a means of giving prolonged treatment to the more favourable class of patient than as a centre of re-education.

It may safely be concluded from the results of the Clacton experiment, that the proposal to establish country colonies is sound from all points of view. The preliminary observation of the patients at the sanatoriums associated with a colony would be a guarantee against the admission of unsuitable cases, the worst handicap under which the Clacton work suffered. Though it is too sanguine to expect such colonies to be entirely self-supporting, it is certain that the labour of the patients could be utilized to reduce most materially the running expenses. There can be no doubt that, if a patient, on discharge from a sanatorium with quiescent or arrested disease, could continue his treatment on a colony for some three to six months, his prospects would be brightened appreciably. When choosing the site for a colony, it is desirable to secure good agricultural land and easy access to a ready market.

# OBSERVATIONS OF A TUBERCULOUS PATIENT.

By HAROLD H. BARNES.

You can never cure a fool of consumption, but it is equally true that a tuberculous patient can never be cured by a fool. All the fools are not situated at the one end of the stethoscope. The hearty co-operation of an intelligent patient with a wise and experienced medical adviser, plentifully endowed with common sense, together with the application of the resources of time and money, mean success every time. Time and money are, unfortunately for most of us, the principal weapons in the fight, especially with our present limited knowledge of principles underlying the rational treatment of tuberculous disease. The greatest handicap to every form of present-day treatment is the foolish attempt to keep a time-table. The motto which ought to be engraved on the portals of every sanatorium is "*Hasten slowly.*" To attempt an arrest in three months, and to lay out a system of treatment to fit that time, is doomed to failure. Unfortunately, this is too prevalent. The importance of the earliest months of treatment cannot be too highly emphasized. The great reaction of the change of life from the one sphere of life which has produced the disease to another of rational living conducted on sanatorium lines is the greatest opportunity we have of turning the tide in favour of the patient. This opportunity once lost, by delay or unsuitable treatment, never returns in the same degree.

It is astonishing and bewildering, from the patient's point of view, to consider the difference of opinions, variation in treatment, and different results, which members of the medical profession hold, practise, and obtain in regard to tuberculosis. Not only do medical practitioners divide themselves into two distinct divisions upon the merits of a particular treatment, but even down to the smallest detail of practical application opinions and procedures are sharply divided. And yet each practitioner claims results to prove the benefits of his practice. Unfortunately, no two cases of tuberculosis are alike: every patient is a law unto himself. No man can say that his method is the correct one, for it can be claimed that they are all correct in the particular cases where favourable results have been obtained. To adopt John Stuart Mill, "The success of a treatment does not prove the truth of a theory on which it was founded; it only proves that the theory was good enough to those particular cases." Precedence is quite a good system to follow, but one must not become a slave to

precedence. The successful physician is not a man or woman with one idea, but the adviser who can select a treatment suitable to the needs of the patient. The success of any and every treatment is governed by two things: the first, the method of application; and the second, the control of auto-inoculation. Results can be negatived by either. Tuberculin in the hands of one man may be a specific, in another an instrument of death.

In a sanatorium, rest, exercise, fresh air, and good food, in the hands of a competent man, produce wonderful results. A patient, however, can be walked to death, killed by the ruin of powers of digestion produced by forced feeding, or the establishment of pneumonia resulting from undue exposure. The mere bricks and mortar of a sanatorium, or a bottle of tuberculin and a syringe, never yet cured anybody. It is the man behind the syringe, the man in charge of the institution, who gets the results. Good results can only be obtained by experience and common sense. After all, the treatment of tuberculosis is common sense scientifically applied.

The second point to take into consideration is the control of auto-inoculation. To quote Marcus Paterson, "The adjustment of the artificial inducement of bacterial products is vitally necessary, since there is always the danger of exciting doses so excessive in character that they may overwhelm the resisting forces. An uncontrolled dose is in the last degree disastrous." This applies not only to graduated exercise and rest, but to every other treatment where exercise is permitted. This fact is apt to be lost sight of, and accounts in the main for the widely different results obtained from the same treatments. Unless the physician thoroughly understands graduated exercise, a special treatment ought to be carried out with only sufficient exercise to keep the patient's muscles in condition. Even when graduated exercise is thoroughly understood, it ought to be quite secondary to any special treatment, unless it is definitely combined as a portion of the treatment, otherwise the results will be misleading.

I should like to say something in passing on the practice of graduated exercise. The majority of patients become chronic, and the period of treatment must necessarily become prolonged indefinitely. To hurry these patients into advanced stages of exercise can only result in disaster. The principal fact to remember is that it is during the period of rest after exercise, or the positive phase of the auto-inoculation, that the resistive forces of the body are increased. Exercise is only the means to this end. You cannot kill a patient with rest, but every death can be traced to excessive exercise. It is just as important to regulate the period of rest after exercise in each individual patient as it is to regulate the amount of exercise necessary to produce the desired amount of bacterial product. The best results

are obtained by prescribing exercise during the highest point of resistance in the positive phase. This can only be done by very careful observation in each individual case. Additional exercise during the negative phase is disastrous. Experience shows that an exercise temperature is not an infallible indication of auto-intoxication, since overexertion often produces a low exercise temperature. But a rest temperature taken an hour after exercise will invariably indicate auto-intoxication by remaining up. High rest temperature frequently does not take place until twelve, twenty-four, or even thirty-six hours after the exercise has been taken. This period is sufficiently long to permit of increased exercise being taken during the negative phase of auto-inoculation, which is the very real danger of taking exercise temperatures, and increasing exercise each day. In my humble opinion the ideal method of providing exercise for chronic patients or when there is extensive active disease is as follows: Exercise to be taken only during the mornings, rest in the afternoons. Exercise to be regulated thus: +, −, =, +. That is, the physician estimates the amount of exercise necessary to produce the desired amount of auto-inoculation—say half a mile. The next day half that amount is prescribed—namely, a quarter of a mile; the third day half a mile; and the fourth day the additional exercise judged necessary. The fifth day will be half of the fourth day, and so on. In this way we get any increased exercise each fourth day, and reduce the danger of increased exercise during a period of auto-inoculation. I make this suggestion with due diffidence. One must remember two things: First, a patient with pulmonary tuberculosis is capable of two distances, the one prescribed by the physician, and governed by the desired amount of toxic absorption; and the other equal to the physical capabilities of the patient, and governed by inclination. The two are never identical. The second thing to insist upon is that chronic patients attain tolerance to toxic absorption and slow reaction to auto-inoculation, which must always be taken into consideration when regulating exercise by temperature.

In conclusion I should like to emphasize the importance of constant change as an adjutant to treatment. Just as the change of life is essential in the early days of the fight, so is a constant change desirable as the patient gets used to the new condition. Change of food, air, treatment, and environment, will often turn their tide in favour of the patient when progress seems to be stationary. As a last resort a change of medical attendant is not without its advantage. A system of exchange of patients amongst our public institutions might be adopted with excellent results.

# INSTITUTIONS FOR THE TUBERCULOUS.

## THE GROSVENOR SANATORIUM, KENNINGTON, ASHFORD, KENT.

THE Grosvenor Sanatorium was built during the latter half of 1914 and the beginning of 1915, to accommodate 110 male patients, and 78 female patients, and was approved in April, 1915, by the Local Government Board under the National Insurance Act, 1911, for the treatment of adult persons suffering from pulmonary tuberculosis. The Sanatorium is erected on an estate of 265 acres, about ten miles from the sea, at an elevation of over 200 feet above sea level. It is two miles from Ashford Junction Station, on the South-Eastern and Chatham Railway main line. The distance from London is fifty-seven miles, which is covered by fast trains in one hour twenty minutes. The Institution is surrounded by pine trees, and is approached by a private carriage-drive of over one mile in length, partly through avenues of limes, silver birches, and in other parts bordered by ornamental plantations, and lines of scots pine, horse-chestnut, and silver birch. The soil upon which the buildings are erected is light gravel. The pavilions for the patients are entirely new buildings, having ground and first floors with verandas ten feet wide, running the whole length on to which beds can be wheeled. The Institution comprises two pavilions, one for male patients, and one for female patients. On each floor of each pavilion there are small wards for seven special cases, adjoining which there are duty rooms. The beds are fully occupied by patients sent through Insurance Committees, County Boroughs, County Councils, and certain Poor Law Authorities. The treatment is carried out by the Medical Superintendent, Dr. Malcolm Barker, and two Assistant Medical Officers, with an adequate staff of nurses with special experience. As patients make progress towards recovery, they are put on exercise and work of various grades to suit their condition, which is under the supervision of the Medical Officers, aided by fully trained gardeners. During 1915, 153 Insurance patients were discharged, 35 of whom left with disease arrested, 95 improved, 22 made no improvement, and 1 died. Of the 153 patients discharged, 121 patients gained 1,116 pounds, being an average of 9·22 pounds per patient; 18 patients lost 45¾ pounds, average loss 2·54 pounds per patient; 12 patients were not weighed on departure; in one case there was no change and 1 patient died. During 1916, 268 Insurance patients were discharged, 41 with disease arrested, 186 improved, 36 not improved, and 5 died; 216 patients gained 1,942 pounds, average gain being 8·99 pounds per patient; 30 patients lost 124 pounds, average loss being 4·14 pounds per patient; 13 patients were not weighed on departure; 4 patients no

change in weight; and 5 died. Owing to the difficulty in obtaining clerical staff, it has been impossible to make a detailed report of the work of the Institution, but the results of treatment have been extremely

GENERAL VIEW OF THE GROSVENOR SANATORIUM, KENNINGTON, ASHFORD, KENT.

satisfactory. During the time the Sanatorium has been opened, a large part of the accommodation for male patients has been occupied by sailors and soldiers, who have been discharged from naval and military hospitals, and at the present time there are under treatment 51 cases.

# NOTICES OF BOOKS.

## THE CAUSATION OF TUBERCULOSIS.

Dr. Louis Cobbett has written a notable monograph on the Ætiology of Tuberculosis, and the Syndics of the Cambridge University Press have issued it in a worthy form in their excellent "Cambridge Public Health Series," which are published under the editorship of Dr. G. S. Graham-Smith and Mr. J. E. Purvis, M.A.[1] The book is a serious, detailed, critical study, and is intended primarily for those who are organizing or administering measures for the extinction of tuberculosis. The subject is approached from the standpoint of the experimental pathologist, and clinical considerations are excluded. The work is of particular service in that it gathers into one conveniently arranged volume all essential data from Blue books and official publications, and particularly the records of researches as set forth by the late Royal Commission on Tuberculosis, the Local Government Board in this country, the Department of Health of the City of New York, and the Imperial Board of Health in Berlin. The major part of the book is devoted to a study of the tubercle bacillus and its varieties, or "types," and treats of their distribution, cultural characters, and comparative virulence for a number of animal species. Special consideration is given to the sharpness of characterization of these types and their stability under conditions which might be supposed to conduce to modification. The opening chapters very forcibly present the magnitude of the tuberculosis problem. As an exposition of ætiology there is no more complete presentation available. We would particularly commend the admirable chapters which deal with the portals of infection. Dr. Cobbett recognizes the three "types," human, bovine, and avian, of the tubercle bacilli; and while admitting that they are probably descended from a common ancestral type, holds that the special characters which they have acquired by adaptation, each to a particular species, or group of species, of animal, and which distinguish them from one another, have become fixed and are now stable. It is shown that the great majority of the fatal cases of tuberculosis in man, probably 94 per cent., are caused by the human type of tubercle bacillus. The remaining 6 per cent. it is admitted are caused by the bovine bacillus, for the avian bacillus has practically no share in the mortality. Of non-fatal cases, and particularly those involving the cervical or mesenteric gland, 50 per cent. are set down as probably due to the bovine bacillus: "Infection with bovine bacilli is commonest in infancy, uncommon after five years of age, and rare in adult life." Dr. Cobbett refers to the view held in Edinburgh regarding the prevalence of lesions of bone and

[1] "The Causes of Tuberculosis, together with Some Account of the Prevalence and Distribution of the Disease." By Louis Cobbett, M.D., F.R.C.S., University Lecturer in Pathology, Cambridge. Pp. xvi + 707, with 7 diagrams, and 23 plates. Cambridge: The University Press. 1917. Price 21s. net.

joint tuberculosis which are thought to be due to the bovine type, and which are put at 58·6 per cent. of the cases, and says: "Elsewhere, however, the Royal Commission in this country, the Gesundheitsamt in Berlin, and the Department of Health in the city of New York, agree in finding the part played by bovine bacilli in this kind of tuberculosis only a small one." The author insists that the importance of tuberculosis is not to be measured only by the fact that it causes, in England and Wales alone, the deaths of over fifty thousand persons each year, but also that a very considerable proportion of the mortality occurs among valuable lives in the very prime of their maturity; and, moreover, that in addition to the losses by death, heavy damage and loss is wrought by the maiming and crippling which results. During the past half-century the number of deaths caused by tuberculosis have steadily declined. The ratio of deaths to population has fallen by more than 50 per cent. It would seem, therefore, that we might well agree with the optimism of the author that "even the most matter-of-fact of us may look forward with confidence to a time, at no very distant date, when society will be relieved of a large portion of this incubus, which at present causes the death of one person in every ten in this island, and cripples and disfigures many another." The book is ably written without unnecessary technicalities, and it is a pleasure to read, not only for the grace of its style, but because the type and paper are of the best. The plates, most of which are reproductions of actual photographs, have been prepared with much skill. Finally, special praise must be given for the well-arranged bibliographical references, which will prove of much permanent value to serious students of tuberculosis.

## THE MORBID ANATOMY AND HISTOLOGY OF PLEURAL AND PULMONARY TUBERCULOSIS.

Professor Maurice Letulle has produced a remarkable work which should be available for all students of tuberculosis. The distinguished author has brought rare artistic skill as well as scientific knowledge to his great task of preparing a descriptive atlas of tuberculosis as it involves the chief intrathoracic structures.[1] It says much for the enterprise and courage of our brave Allies that scientists and publishers have co-operated to issue this notable work in such a worthy form amidst the hazards and difficulties of the great war. We offer our warmest congratulations to all who have been concerned in the preparation and publication of this beautiful work. During recent times we have been so much taken up with bacteriological researches and experimental investigations relating to tuberculosis, that there has been some neglect in the study and teaching of the morbid histology and gross anatomy of tuberculous lesions of the lung and pleura. It is not easy to afford students adequate opportunities for the examination of tuberculous cases in the post-mortem room, and there are few busy medical practitioners who are able to attend at autopsies on phthisical

[1] "La Tuberculose Pleuro-Pulmonaire: Cent-Sept Planches Autochromes." Par Maurice Letulle, de l'Académie de Médecine, Professeur à la Faculté de Médecin de l'Hôpital Boucicaut. Pp. 366, avec 107 planches autochromes hors texte. Paris: A. Maloine et Fils, 27, Rue de l'École de Médecine. 1916. Prix 55 francs.

subjects. And yet without a sure basis of knowledge in the morbid anatomy of consumption the clinician cannot expect to reach to any very high degree of skill in the diagnosis and prognosis of this class of case. Professor Letulle's fine coloured plates, with their splendidly arranged labelling and accompanying very complete descriptions, brings the finding of the post-mortem room and the revelations of the microscope into the doctor's study and consulting-room. The volume contains no less than 107 finely coloured plates, each an artistic masterpiece as well as being a record of pathological fact expressed with scientific precision. The work is unique, and a copy should be in the possession of every tuberculosis officer and medical superintendent of a sanatorium or other institution where consumptives are under treatment. We would also strongly advise all medical practitioners to study this atlas, for every doctor is almost certain to be consulted regarding tuberculosis involving the chest, and this elaborate pictorial portrayal of the processes of tuberculous disease will probably do more to guide to a helpful understanding than the most detailed and elaborate of verbal descriptions. The album, moreover, is scarcely one which will readily become out of date, but must remain as a permanently valuable work of reference.

## PULMONARY TUBERCULOSIS AND INDUCED PNEUMOTHORAX.

Dr. Clive Riviere is an enthusiastic believer in the benefits of artificial or induced pneumothorax for many cases of pulmonary tuberculosis, and in his recently issued monograph a complete study and guide is provided which will be of service to medical practitioners generally, as well as of special interest to tuberculosis officers, medical superintendents of sanatoria, and others called to advise regarding the treatment of chest cases.[1] The work affords a concise exposition of the mode of action of artificial pneumothorax, discusses indications and contra-indications, describes the appropriate apparatus employed, the technique of the initial operation, the procedure in refilling and the general régime which should be adopted. The physical signs elicited in cases submitted to pneumothorax, and the effects of the operation on the affected lung and other thoracic organs, are dealt with. A chapter is devoted to the consideration of pleurisy as a complication, and in a further chapter there are enumerated the accidents of pneumothorax treatment. Dr. Riviere claims that the treatment of pulmonary tuberculosis by pneumothorax can be regarded as "no less than a great and beneficent discovery," and that its rôle is "to rescue those formerly beyond the bounds of human aid, to restore the lost to life, or at least to a measure of comfortable existence." The author further urges that it is to the "lost" case of phthisis that pneumothorax treatment offers a chance of life and recovered health, and this, as one of its exponents has justly affirmed, is its "high aim." Dr. Riviere has presented his case with considerable ability and literary skill, and although many will criticize some of his conclusions, the monograph is one which all students

[1] "The Pneumothorax Treatment of Pulmonary Tuberculosis." By Clive Riviere, M.D., F.R.C.P., Physician, City of London Hospital for Diseases of the Chest, Victoria Park, etc. Pp. xv + 186, with 10 figures and 2 plates. London: Henry Frowde and Hodder and Stoughton. 1917. Price 6s. net.

of practical measures for the arrest and alleviation of pulmonary tuberculosis should study with discrimination and thoroughness. The illustrations and radiograms much add to the value of the book.

## TRAUMATIC TUBERCULOSIS.

What part does traumatism play in particular cases of alleged traumatic tuberculosis? This is a question which sometimes has to be answered by the medical adviser, and may have to be discussed in the courts of law. Dr. F. Parkes Weber has attempted to provide an answer:[1] "We have to admit that in all cases (excepting those in which an inoculation with tubercle bacilli from without occurs—a class which we are not now dealing with) tuberculosis of some kind, whether latent or not, must have been present (that is to say, tubercle bacilli must have been present) before the trauma was received. In short, cases of contusional traumatic tuberculosis may, as I have already pointed out, be roughly divided into two classes: those in which obvious tuberculosis existed, and those in which no tuberculosis recognizable by ordinary clinical methods existed, previously to the traumatism. In the former class of cases the traumatism merely accelerated the progress of (produced an exacerbation of) an already existing—that is to say, clinically manifest—disease and it is quite likely that the disease would have ultimately progressed even in the absence of traumatism. But in the second class the patient's condition previously to the traumatism is accepted as having been just like that of any other apparently healthy person, and (knowing as one does that very many apparently healthy individuals carry, hidden away in their bodies, minute tuberculous foci which never give rise to serious trouble) one has no right to suppose that the latent tuberculosis in question would, under ordinary circumstances (*i.e.*, apart from the results of traumatism, etc.), ever have progressed sufficiently to become recognizable by ordinary examination or to give rise to any serious trouble." The subject is one of much practical importance at the present time, and Dr. Parkes Weber's erudite monograph merits careful study.

## CONGENITAL TUBERCULOSIS.

"Genuine cases of congenital tuberculosis in human beings are undoubtedly very rare, and it has been generally thought that they only occurred when the mother was in an advanced stage of tuberculosis (probably suffering from miliary dissemination and tuberculous bacillæmia), but more recent observations (Weller, Warthin, Novak, and Ranzel) seem to show that placental tuberculosis may likewise occasionally develop when the mother's tuberculosis is not far advanced, or even latent or quiescent." This is the opening paragraph of Dr. F. Parkes Weber's able monograph on congenital tuberculosis, which not only provides a critical survey of the literature of the subject, but supplies the best available bibliography.[2]

[1] "Traumatic Pneumonia and Traumatic Tuberculosis." By F. Parkes Weber, M.A., M.D., F.R.C.P. Printed, with additions, from articles in the *Clinical Journal*, London, July, 1916. Pp. 63. London: Adlard and Son and West Newman, Bartholomew Close. 1916. Price 6d.

[2] "Congenital Tuberculosis: A Survey." By F. Parkes Weber, M.A., M.D., F.R.C.P. Pp. 21. Reprinted from the *British Journal of Children's Diseases*, November and December, 1916. London: Adlard and Son and West Newman, Bartholomew Close, E.C. 1917.

## THE PREVENTION OF TUBERCULOSIS.

The eradication of tuberculosis from the lamentably long list of scourges which afflict mankind will never be accomplished until all sorts and conditions of the community are willing and able to co-operate in the conduct of prophylactic measures. The essential factor for securing further progress is the enlightenment of the people. Dr. Clive Riviere has therefore done well to write a popular handbook on the Avoidance of Tuberculosis.[1] This attractively written little exposition is one which every thoughtful man and woman may peruse with advantage. The book will also be of service to tuberculosis officers and others engaged in educational work. As the author rightly claims, "every individual should possess such knowledge of its [tuberculous disease] symptoms of onset that its presence may be suspected at a stage where it is still fully curable." Dr. Riviere's views on tuberculosis in early life are well known, and the following quotation clearly summarizes his teaching: "In *infancy* the danger is that of 'infection,' particularly with the virulent 'human' tubercle bacillus and by the susceptible respiratory tract. For this we may artificially substitute, with great increase of safety, the mild bovine bacillus entered through the resistant alimentary tract. In *early childhood*, and up to the age of five or six years, the question of gross infection from human sources still remains a menace, since the child may still be 'tubercle free,' and tuberculosis tends to run an acute and fatal course. With the more varied environment of increasing years, catarrhs and the infective 'fevers,' particularly whooping-cough and measles, become common, and are important predisposing causes of the spread of tubercle. Young children must be protected from the risk of these diseases till the latest possible age; rickets, which predisposes to catarrhs, must be avoided, or treated if present. In *later childhood*, and throughout school life, a very marked resistance to tuberculous disease is apparent. Infection in earlier years has brought with it 'immunity,' and disease, if it occurs, is generally well localized and readily recoverable. Predisposing causes, especially deficient nutrition, convalescence from illness, persistent or repeated catarrhs, are conditions where vigilance needs to be exercised."

## I.K. THERAPY.

The treatment of tuberculosis by means of Spengler's immune bodies is dealt with in all its bearings in a very complete, well-arranged, and effectively presented monograph recently published by Dr. Niven Robertson.[2] The subject is considered in both its theoretical and practical aspects, and the conclusions are the outcome of considerable experience. The author is candid, for he writes in his preface: "Although my own results with I.K. have not been striking, they have not discouraged me in its further trial and use, but have rather in-

[1] "Tuberculosis and How to Avoid It." By Clive Riviere, M.D., F.R.C.P. Pp. 127. London: Methuen and Co., Ltd., 36, Essex Street, Strand, W.C. 2. 1917. Price 1s. net.

[2] "The Treatment of Tuberculosis by Means of Spengler's Immune Bodies (I.K. Therapy)." By Niven Robertson, M.D., D.P.H., Medical Superintendent, National Sanatorium, Benenden, Kent. Pp. xiii + 149. With Charts. London: Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C. 1917. Price 5s. net.

creased my desire to get other clinicians to try it. I certainly think from clinical results that I.K. has as much right to an extended trial as tuberculin." Dr. Robertson is cautious, and his judgments merit respect and careful consideration. He says: "I scarcely think that we can boast of any of our therapeutic measures in the treatment of pulmonary tuberculosis producing rapid and brilliantly successful results," but he urges that "I.K. should be more widely known and made further trial of." The monograph provides a detailed account of Spengler's immune bodies, with detailed instructions regarding the use of "I.K." Much of the volume is devoted to a record of cases. The general conclusion may well be quoted: "From a survey of the whole question, therefore, the conclusion is that I.K. is of value in the treatment of pulmonary tuberculosis, as the majority who have as yet used it speak in its favour, but there are some who have used it extensively and found it indifferent in its effects; and from my own results, I must place myself amongst those who regard it as of doubtful value as a specific remedy. In regard to the specific value of I.K., I must conclude that the question is still not completely settled." There is a useful bibliography. The book is one which all desirous of forming a sound judgment as to the rôle and possible service of I.K. should study before undertaking treatment with this agent.

## MANUALS FOR MEDICAL ADVISERS AND WORKS OF REFERENCE.

Sir John Bland-Sutton's classic work on Tumours is one which should be in the possession of every medical practitioner. A new edition has recently been published.[1] The work was first issued in 1893. It is a concise yet comprehensive treatise on all forms of neoplasm. Many chapters have been re-written, some expanded, and all are brought up to date. Much space is rightly devoted to a consideration of cancerous growths. Whenever possible, references are made to the results of researches into Comparative Pathology. The numerous illustrations alone make the volume a notable one. At the end of many of the sections there is a select bibliography. Sir John Bland-Sutton has rendered invaluable service to pathologists and clinicians by the publication of this new edition. It is a volume which we would particularly commend to the notice of tuberculosis and other specialists as likely to develop a broad, scientific, and serviceable outlook on the problems of disease.

Sir Robert Jones, the well-known expert in all orthopædic matters, has published a remarkably valuable collection of notes on orthopædic procedures in military practice.[2] The work is one which should be

[1] "Tumours, Innocent and Malignant: Their Clinical Characters and Appropriate Treatment." By Sir John Bland-Sutton, LL.D, F.R.C.S., Surgeon to and Chairman of the Cancer Investigation Committee of the Middlesex Hospital, etc. Sixth Edition. Pp. ix + 790. With 383 Illustrations. London: Cassell and Co., Ltd. 1917. Price 21s. net.

[2] "Notes on Military Orthopædics." By Colonel Robert Jones, C.B., Inspector of Military Orthopædics, Army Medical Service. With an Introductory Note by Surgeon-General Sir Alfred Keogh, G.C.B., Director-General Army Medical Service. Pp. xiv + 132. With 128 Figures. London: Cassell and Co., Ltd., for the British Red Cross Society. 1917. Price 2s. 6d. net.

studied by all engaged in medical military service. But we particularly desire to direct attention to this most practical volume in this journal, for it indicates the spirit and purpose and something of the practical measures which medical practitioners should bring to the management of many forms of so-called surgical tuberculosis. Sir Alfred Keogh, in his "Introductory Note," indicates that "it is not merely the methods of cure which, for years to come, will confront the surgeon. The relation of disabilities to earning capacity is one of the most important problems of the day. A large part of this subject comes within the domain of Orthopædic Surgery, and, indeed, the relation of physical infirmity to industrial work has become a question of no little moment." Sir Robert Jones has written a work which deserves to be studied in its entirety by all who have to treat cripples of every age and class. We hope the author of this timely monograph will some day favour us with a complete study on all aspects of the problem for bettering the lot of the tuberculous cripple.

Dr. Charles V. Chapin has contributed to the valuable series of "Harvard Health Talks" a practical little manual on Infection.[1] It is written in a lucid, non-technical, and attractive form which will appeal to the ordinary thoughtful citizen. As a guide to laymen anxious to play their part in the prevention of disease it should accomplish a useful service. The brochure is one which tuberculosis officers may wisely place in the hands of their patients. All medical practitioners, nurses, and practical workers for health will do well to procure and circulate this sensible, informing, and helpful manual.

The Milk Question is one which appeals not only to medical practitioners, but to all seriously-minded citizens and dairy farmers, tuberculosis officers, child-welfare workers. All workers engaged in duties relating to human health and happiness, and touching the care and control of cattle, should read the brochure recently written by the Hon. Mrs. Lionel Guest.[2] This short, crisp, direct presentation of facts and serviceable exposition of ways and means whereby existing dangers may be diminished and general betterment secured in our milk supply will appeal to all thoughtful men and women. Mrs. Guest quotes the experience and opinion of Sir Thomas Mackenzie, the present High Commissioner for New Zealand, regarding the prevalence of tuberculosis among milch cows in this country, and our apparent apathy and unaccountable neglect in dealing with the menace. Our readers should study Mrs. Guest's enlightening little volume.

Dr. Walter G. Walford in 1910 published a suggestive monograph on "Cerebral Congestion and Tight Neck-Clothing," and this has recently been followed by a more elaborate work on the Dangers arising from Certain Forms of Neck-Wear.[3] The work is that of an enthusiast who writes with conviction and originality, and his contentions certainly merit fullest consideration. We particularly commend a careful study of the monograph to all tuberculosis officers and other

[1] "How to Avoid Infection." By Charles V. Chapin, M.D., Sc.D., Superintendent of Health, Providence, R.I. Pp. 88. Cambridge, U.S.A.: Harvard University Press. 1917.

[2] "The Cow and Milk Book." By the Hon. Mrs. Lionel Guest. Pp. 175. London: John Lane, The Bodley Head, W. 1917. Price 1s. net.

[3] "Dangers in Neck-Wear." By Walter G. Walford, M.D. Pp. xi+171. With Frontispiece, Diagram, and 13 Figures. London: H. K. Lewis and Co., Ltd., 136, Gower Street, W.C. 1917. Price 4s. 6d. net.

medical practitioners dealing with tuberculous cases. Dr. Walford writes: "Who can have failed to notice the peculiarly small neck in the consumptive sufferer, and how it is almost invariably tightly muffled up, under the very mistaken notion that this is necessary?" The question of neck-wear is certainly one which all superintendents of sanatoria should consider. Perhaps some enterprising R.A.M.C. officer will be able to put Dr. Walford's ideas to the test as regards our men in khaki.

All engaged in the Anti-Tuberculosis Campaign should be expected to lend their aid as far as may be possible in the Anti-Venereal Diseases Movement. The essential first steps must be educational. Mr. Bishop-Harman has contributed to the excellent "Methuen's Health Series" of manuals, of which he is general editor, an enlightening little volume.[1] In arresting language the fundamental facts of sex are set forth, and the conclusions of the Report of the Royal Commission on Venereal Diseases explained. The necessary principles and practices for preventing and arresting venereal diseases are lucidly described. The work is one which every citizen should read. It is just the manual which a family doctor can safely recommend to those who look to him for guidance and advice.

The last volume of the Transactions of the American Pediatric Society contains many articles which will be of special interest to tuberculosis officers and others dealing with tuberculous and tuberculously-disposed children.[2] Reference may be made to the following: "Fresh Air in Pediatric Practice," by Dr. R. G. Freeman; "A Study of the Topography of the Pulmonary Fissures and Lobes in Infants, with Special Reference to Thoracocentesis," by Drs. J. C. Gittings, G. J. Fetterolf, and A. G. Mitchell; "The Bacteriology of the Urine in Healthy Children and those suffering from Extra-urinary Infections," by Drs. C. Beeler and H. F. Helmholz; and "Meningitis in the Newborn and in Infants under Three Months of Age," by Dr. H. Koplik.

"Organo-Therapeutic Products" is a useful brochure giving practical information regarding the principles of hormone therapy and the preparation and uses of organ extracts.[3]

We have just received as this number is going to press a copy of Dr. Charles Porter's new textbook for students and practitioners of medicine on the Elements of Hygiene and Public Health. Tuberculosis receives full consideration. We hope to review this notable manual in our next issue.[4]

[1] "Staying the Plague." By N. Bishop-Harman, M.A., M.B., F.R.C.S. Pp. viii+120. London: Methuen and Co., Ltd., 36, Essex Street, Strand, W.C. 1917. Price 1s. net.

[2] Transactions of the American Pediatric Society. Twenty-eighth Session. Edited by Linnæus Edford La Fétra, M.D. Vol. XXVIII. Pp. xiii+338. Philadelphia, Pa., U.S.A.: American Pediatric Society, Howard Childs Carpenter, M.D., Secretary, 1805, Spruce Street. 1917.

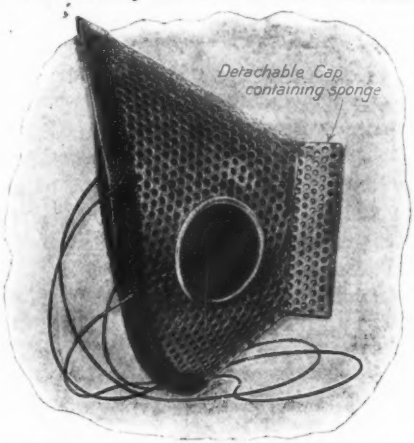
[3] "Organo-Therapeutic Products" is published by Evans, Sons, Lescher and Webb, Ltd., 56, Hanover Street, Liverpool, and 60, Bartholomew Close, London, E.C., and issued from the Bacteriological Research Laboratories, Higher Runcorn, Cheshire. A copy will be sent to any medical practitioner on application.

[4] "Elements of Hygiene and Public Health: A Textbook for Students and Practitioners of Medicine." By Charles Porter, M.D., B.Sc., M.R.C.P.E., of the Middle Temple, Barrister-at-Law; Medical Officer of Health for the Metropolitan Borough of St. Marylebone. Pp. xiv+411. With 98 Illustrations. London: Henry Frowde and Hodder and Stoughton. 1917. Price 12s. 6d. net.

# PREPARATIONS AND APPLIANCES.

## THE "LOMBARD" ORO-NASAL INHALER.

THE treatment of cases of laryngeal and pulmonary tuberculosis by the continuous method of medicated inhalation has found much favour. It is important, however, that a reliable form of oro-nasal inhaler should be employed. Undoubtedly the best is the "LOMBARD," the chief




features of which are illustrated in the accompanying illustration. After extensive trial of a variety of forms, we have no hesitation in recommending this as the most effective and generally serviceable.[1]

## SANATOGEN.

SANATOGEN has justly won a world-wide reputation. Although originally of Teutonic origin, it is now being prepared in this country by a British firm, the chairman of which is Lady Mackworth, the daughter of Lord Rhondda. For the present the old name "Sanatogen" is retained, but it is proposed to replace this designation by the title of "GENATOSAN." This preparation is undoubtedly of much value in the management of tuberculosis and cases tuberculously predisposed. It usually leads to the development of an increase in weight, with marked improvement in appetite, nervous reaction, and general physical powers. Wherever there is impaired nutrition, loss of nervous powers, impairment in digestion, and anæmia, it may well be given a trial.

[1] The "Lombard" oro-nasal inhaler is supplied by Messrs. Allen and Hanburys, Ltd., 37, Lombard Street, E.C., and 7, Vere Street, Cavendish Square, W. 1. Price 1s. 6d. This firm also supplies a useful series of inhalants under the designation "Spiromol Solutions." Reference should be made to a convenient illustrated price list on "Throat, Nose, and Ear Therapy," which is issued by Messrs. Allen and Hanburys.

The presence of the calcium element seems to exercise a specially valuable therapeutic power in many cases of wasting in tuberculous subjects. Children with a tendency to tuberculosis or the so-called status catarrhalis often improve markedly under it. During these strenuous war days of stress and strain, Sanatogen might well be recommended as a valuable prophylactic.[1]

## CRÊPE BANDAGES.

About the middle of last century Alfred Velpeau, a Paris surgeon, introduced the CRÊPE BANDAGE, which speedily ousted the old-fashioned forms made of caoutchouc. The crêpe bandages manufactured at one time almost exclusively in Geneva, are now being made of excellent quality and in convenient sizes by the Norwich Crêpe Company. The specimens submitted to us are light, soft, and highly elastic, and allow of free ventilation. They can be washed and sterilized, and with reasonable care, have a long life. Medical Superintendents of hospitals and sanatoria, and all medical practitioners and nurses, should make a point of testing for themselves the reliability and general excellence of these British-made crêpe bandages.[2]

## REQUISITES FOR THE SANATORIUM AND ITS PATIENTS.

Messrs. Parke, Davis and Co. supply an excellent series of preparations, specially designed to meet the requirements of cases of bronchial catarrh and other affections accompanied by inflammatory states of the respiratory tract. Certain of these, and particularly Cocillana Compound Syrup, Heroin, and Terpin Hydrate Elixir, Anodyne Pine Expectorant, and Anodyne Pine Expectorant with Heroin, will be found of much service in the treatment of some tuberculous cases.[3]

To the excellent series of "Vaporoles," a Chloroform member, containing 3 minims, has been added. It is primarily intended to relieve ear-ache in non-suppurative conditions, but it will also be valuable as an ameliorative agent in certain conditions where an antispasmodic and sedative is required with action which can be immediate.[4]

Lysol, Ltd., have introduced an excellent British form of "LYSOL," and a series of excellent "Lysol" hygienic preparations, all of which are admirably adapted for systematic use by tuberculous patients in sanatoria, hospitals, and other institutions, or for use in their own homes.[5]

[1] Specimens and full particulars regarding Sanatogen may be obtained on application being made to Genatosan, Ltd., 12, Chenies Street, London, W.C. 1.

[2] For particulars regarding the British-made crêpe bandages, application should be made to the manufacturers, the Norwich Crêpe Company, 1856, Ltd., St. Augustine's Factory, Norwich, or the London agent, Mr. Thomas S. Eastaway, 7, Wool Exchange, Basinghall Street, London, E.C. 2.

[3] Full particulars may be obtained from Mersrs. Parke, Davis and Co., 50-54, Beak Street, Regent Street, London, W. 1.

[4] The "Vaporole" of Chloroform is supplied by Messrs. Burroughs Wellcome and Co., Snow Hill Buildings, London, E.C.

[5] Specimens of the "L" Brand of "Lysol," and "Lysol" soap, and "Osyl" Tooth Powder and Paste, with full particulars and prices, may be obtained on application to Lysol, Ltd., Crayford Mills, Warton Road, Stratford, London, E.

# THE OUTLOOK.

## NOTES AND RECORDS.

THE American National Association for the Study and Prevention of Tuberculosis has organized with great success a Scientific and Popular Campaign against Tuberculosis in the United States. Its numerous publications have carried valuable information and ideas into all parts of the world, and English-speaking peoples everywhere have been indebted to the wisdom and enterprise of the representative body which from its headquarters in New York sends out influences which have been of immense service to humanity everywhere. We are now glad to welcome the coming of a new scientific journal, *The American Review of Tuberculosis*. It is appearing monthly, and the first three issues which have reached us are full of promise. All connected with the initiation and issue of this admirable record and review of new work dealing with all aspects of the tuberculosis problem are to be congratulated.[1]

Artificial Pneumothorax has been extolled by many as an effective means for dealing with selected cases of pulmonary tuberculosis. Dr. Jerome E. Cook, from a critical study of recent literature, in an article entitled "Results in the Treatment of Pulmonary Tuberculosis by Artificial Pneumothorax,"[2] arrives at the following conclusions: 1. The complications following artificial pneumothorax are so serious as to contra-indicate the procedure in incipient or early favourable cases. 2. In moderately advanced cases or early progressive cases with unfavourable clinical symptoms, such as repeated hæmoptyses, high fever, or excessive cough, the method may be tried. In a fair percentage of these cases improvement will take place and the patient will apparently be saved. However, protracted observation will materially reduce the number of those cases to whom the method seemed to offer a cure of their tuberculosis. 3. Artificial pneumothorax is not in any sense a cure for consumption. In carefully selected cases it may be productive of some good.

We have received the following announcement regarding the Edward L. Trudeau Foundation for Research and Teaching in Tuberculosis:—"An endowment fund has been created as a *Memorial* to the late Dr. Edward L. Trudeau, to perpetuate his name and to continue

[1] *The American Review of Tuberculosis* is issued as the Journal of the National Association for the Study and Prevention of Tuberculosis. Dr. Edward R. Baldwin, of Saranac Lake, is the editor-in-chief. It is published monthly at 2419-21, Greenmount Avenue, Baltimore, Md., U.S.A. Subscriptions should be sent to the headquarters of the National Association for the Study and Prevention of Tuberculosis, 105, East 22nd Street, New York City. To members the subscription price is $2.00, and to non-members $3.00 per volume.

[2] The article appears in the *Interstate Medical Journal* for January, 1917, published by the Modern Hospital Publishing Co., Inc., St. Louis, U.S.A.

the scientific investigations that were a lifelong interest of the American pioneer in tuberculosis research. The income is to be devoted to the following purposes: (1) To maintain laboratories and carry on *Research* into the nature, causes and treatment of tuberculosis. (2) To maintain regular courses of instruction for physicians and others in the most advanced knowledge of the above subject, under the name of the *Trudeau School of Tuberculosis*. (3) To offer to young physicians the opportunity to engage in research work, while undergoing treatment for the disease, through the establishment of *Fellowships*. The Trustees of the Trudeau Sanatorium are to administer this fund, with the aid of an *Advisory Council* of distinguished investigators and teachers, consisting of Professor William H. Welch and Professor Theodore C. Janeway of Johns Hopkins University; Dr. Herman M. Biggs, New York State Commissioner of Health; Dr. William H. Park, Director of Research Laboratory, New York City Health Department; Professor Theobald Smith, Director of Department of Animal Pathology, Rockefeller Institute, Princeton, N.J.; Professor Warfield T. Longcope, Colombia University; Professor Thomas McCrae, Jefferson Medical College, Philadelphia, Pa.; Dr. John H. Lowman, Western Reserve University, Cleveland, O., and Dr. Vincent Y. Bowditch, of Boston.

"The Trudeau School of Tuberculosis hold two courses of six weeks' duration each year, in January and June, for physicians who desire to study tuberculosis intensively and to perfect themselves in the diagnosis and treatment of tuberculosis, including institutional methods. The courses provide both clinical and laboratory instruction. A limited number of Fellowships are granted each year to qualified workers, preferably those who are or may have been under treatment for tuberculosis. The aim is to give preference to graduate physicians but undergraduates and (non-medical) science students may be eligible."[1]

The Chicago Tuberculosis Institute,[2] which issues periodically an informing *Bulletin*, have published a collection of Lectures delivered before the Robert Koch Society for the Study of Tuberculosis. The volume contains a portrait frontispiece of the late Theodore Bernard Sachs, M.D., who was born in Russia, May 2, 1868, and died April 2, 1916, in Chicago, having made for himself a permanent place among the pioneers of the tuberculosis movement. The subjects dealt with relate to many important questions touching tuberculosis and associated problems, and among the contributions are the following: "Chemotherapy of Tuberculosis," by Professor H. Gideon Wells; "The Treatment of Pulmonary Tuberculosis with Artificial Pneumothorax," by

[1] Applications for Fellowships should be made with full details of previous experience and suitable recommendations, including that of the condition of health, to the Director, Trudeau Foundation, Saranac Lake, N.Y., U.S.A.

[2] The Chicago Tuberculosis Institute is the Central Headquarters of the Anti Tuberculosis Movement in Chicago, and is situated at 8, South Dearborn Street. The Institute claims that it "stands ready at all times to furnish, free of charge, full information in regard to the various tuberculosis institutions, to give information for the care and treatment of tuberculosis, and to supply literature of instruction, and to answer all inquiries." The volume above referred to is entitled "Sundry Lectures on the Medical Phases of Tuberculosis delivered before the Robert Koch Society for the Study of Tuberculosis," and includes lectures and addresses given from February 11, 1913, to April 20, 1916. "Lectures on Tuberculosis, delivered before the Theodore B. Sachs Tuberculosis Study Class," is a booklet of 32 pages, issued under the auspices of the Institute.

Dr. W. A. Gekler; "Therapeutic Use of Tuberculin," by Dr. Charles L. Minor; "The Present Status of Tuberculin Therapy," by Dr. Louis Hamman; "Relative Importance of Bovine and Human Sources of Infection in the Production of Tuberculosis," by Dr. M. P. Ravenel; "Present Status of Immunization against Tuberculosis," by Dr. Gerald B. Webb; "Etiology and Morbid Anatomy of Bone and Joint Tuberculosis," by Dr. Charles M. Jacobs; "Non-operative Treatment of Tuberculosis of Bones and Joints," by Dr. John L. Porter; "Non-Tuberculous Lesions occurring in Tuberculosis," by Dr. Joseph Zeisler; "Treatment of Cutaneous Tuberculosis," by Dr. William A. Pusey; "The Larynx in the Early Stages of Pulmonary Tuberculosis," by Dr. Elmer L. Kenyon; "Pregnancy and Tuberculosis," by Dr. Charles S. Bacon; "Clinical Symptoms and Physical Signs in Early Diagnosis of Tuberculosis," by Dr. F. M. Pottenger; "Complement Fixation in Tuberculosis," by Dr. H. J. Corper; "The Specific Roentgen Markings Characteristic of Pulmonary Tuberculosis," by Dr. Kennon Dunham; and "The Lymphatics and Lymphoid Tissue of the Lung, and their Relation to Disease Processes," by Dr. W. S. Miller. The Institute has also published a series of Lectures delivered before the Theodore B. Sachs Tuberculosis Study Class.

We have received copies of an interesting *Anti-Tuberculosis Bulletin* which give information regarding the progress of the movement for the prevention and arrest of Tuberculosis in the Philippine Islands.[1]

Bulletin No 21, of the Russell Sage Foundation contains a valuable bibliography of recent studies on "Employment for the Handicapped," and some of these references will be of special service to those dealing with tuberculous cripples.[2]

The Twentieth Annual Report of the Loomis Sanatorium has recently been issued, and contains numerous full-page illustrations and much information regarding this justly famous centre for the study and treatment of tuberculosis.[3]

Dr. O. Amrein has sent us plans and particulars of the new Sanatorium Altein-Arosa, recently opened in this famous Swiss centre well known to, and much appreciated by, many Britishers in bygone years.[4]

Dr. Hugh M. Kinghorn of Saranac Lake, N.Y., has favoured us with a copy of a suggestive study of "Appendicitis and Pulmonary Tuberculosis," based on an investigation of forty-three cases.[5]

The question of housing is closely connected with the prevention and arrest of tuberculosis. A very suggestive study on "The Problem of the Small Dwelling and its Solution," by Mr. Robert Thomson,

[1] *The Anti-Tuberculosis Bulletin* is published by the Philippine Islands Anti-Tuberculosis Society, of which Dr. Sixto Dee, Los Angeles, is President, and Dr. José Fabella, Secretary. The office is in Fajardo Building, Rizal Avenue, Manila. It is issued monthly, and the annual subscription is 50 centavos.

[2] "Employment for the Handicapped: A Select Bibliography," is No. 21 of the Bulletins issued bi-monthly by the Russell Sage Foundation Library, 130, East Twenty-Second Street, New York City.

[3] A copy of the "Twentieth Annual Report of the Loomis Sanatorium for the Treatment of Tuberculosis," may be obtained on application to Dr. Herbert Maxim King, Physician-in chief, Liberty, Sullivan County, New York.

[4] Full particulars regarding the new sanatorium Altein-Arosa may be obtained on application to Dr. O. Amrein at Arosa, Graubünden, Switzerland.

[5] "Appendicitis and Pulmonary Tuberculosis," by Hugh M. Kinghorn, M.D., reprinted from *The Journal of the American Medical Association*, December 16, 1916, and issued from 535, North Dearborn Street, Chicago.

is appearing in issues of *The Building News*, and we would particularly direct attention to the valuable series of original plans which accompany this important communication.[1]

Under the title of "A Sanctuary for Little Pilgrims" there has been issued an album of excellent pictures of the Children's Sanatorium at Harpenden, together with descriptive articles. The Sanatorium is connected with the National Children's Home and Orphanage.[2]

A timely new journal has just appeared under the title of *Recalled to Life*. It is devoted to the record and study of measures for the Care, Re-education, and Return to Civil Life of Disabled Sailors and Soldiers. The first issue is full of promise, with notable articles, numerous illustrations, and the journal is admirably got up.[3]

From the offices of *Country Life* there have just been issued two practical booklets dealing with profitable methods of Goat-Keeping and Rabbit-Rearing, which well deserve the study of those responsible for the conduct of sanatoria and open-air schools.[4]

The attention of many open-air patients who are able to pursue the mild and contemplative sport of the angler may well be directed to the new and fifty-first annual edition of "The Angler's Diary." This practical reference book contains an immense amount of serviceable information which fishermen will know how to appreciate.[5]

[1] "The Problem of the Small Dwelling and its Solution," with illustrations by Robert Thomson, appeared in *The Building News* for May 23 and 30, and June 6, 13, 20, 27, 1917.

[2] "A Sanctuary for Little Pilgrims," contains particulars of the work of the Children's Sanatorium at Harpenden, and copies may be obtained on application to the headquarters of the National Children's Home and Orphanage, 104-122, City Road, London, E.C. 1. Price 1s. net.

[3] *Recalled to Life*. Editor: Lord Charnwood. Assistant Editor: Evarard Cotes. Published periodically by John Bale, Sons and Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1. Price 2s. net.

[4] "Goat-Keeping in War-Time" and "Rabbit-Keeping in War-Time." By C. J. Davies. Published at the offices of *Country Life*, Ltd., 20, Tavistock Street, Covent Garden, W.C. 2, and by George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C. 2. Price 7d. net each.

[5] "The Angler's Diary and Tourist Fisherman's Gazetteer of the Rivers and Lakes of the World." Pp. 190. With Diary. London: *The Field and Queen* (Horace Cox), Ltd., Windsor House, Bream's Buildings, E.C. 4. 1917. Price 1s. 6d.